# Canadian Journal of PUBLIC HEALTH



Volume 46 MAY 1955 Number 5



•

*Published Monthly by the*
CANADIAN PUBLIC HEALTH ASSOCIATION
150 COLLEGE STREET, TORONTO 5

# SCHOOL OF HYGIENE

**University of Toronto**

**DIPLOMA IN PUBLIC HEALTH**
*for graduates in Medicine*

In addition to the regular courses of instruction, provision has been made to permit suitably qualified candidates to receive the basic training in public health and to prepare for appointments in the following special fields:

Public Health Nutrition
Public Health Education
Administration of Medical Care Plans.

**DIPLOMA IN HOSPITAL ADMINISTRATION**
*for university graduates*

**DIPLOMA IN INDUSTRIAL HYGIENE**
*for graduates in Medicine*

**DIPLOMA IN DENTAL PUBLIC HEALTH**
*for graduates in Dentistry*

**DIPLOMA IN VETERINARY PUBLIC HEALTH**
*for graduates in Veterinary Science*

**MASTER OF APPLIED SCIENCE**
*for graduates in Engineering*

**CERTIFICATE IN PUBLIC HEALTH**
*for graduates in Arts or Sciences*

**CERTIFICATE IN PUBLIC HEALTH**
with specialization
*for graduates in Arts or Sciences*

*Specialization permitted in*
Public Health Nutrition, Public Health Education, Sanitation, Bacteriology and related subjects.

*For information write*
The Director, School of Hygiene, University of Toronto,
Toronto, Ontario.

**THE CANADIAN INSTITUTE OF SANITARY INSPECTORS**

*announces the holding of its*

# TWENTY-FIRST NATIONAL CONVENTION

**PRINCE ALBERT NATIONAL PARK**

**Waskesiu, Saskatchewan**

**AUGUST 15, 16 and 17, 1955**

# *Canadian Journal of*
# PUBLIC HEALTH

VOLUME 46 MAY 1955 NUMBER 5


## CONTENTS

### ARTICLES:



### EDITORIAL SECTION:



### DEPARTMENTS:




The Canadian Journal of Public Health is published monthly by the Canadian Public Health Association. Editorial and business offices, 150 College Street, Toronto 5, Ontario. Subscription $3.00 a year, payable in advance. Single copies 50 cents. Authorized as second-class mail, Post Office Department, Ottawa.

*Canadian Journal of*
# PUBLIC HEALTH

VOLUME 46 TORONTO, MAY 1955 NUMBER 5

## Care and Survival of Immatures in Saskatchewan

M. S. ACKER, M.D., D.P.H. AND S. C. BEST, M.D., M.P.H.
*Director of Research and Statistics*
*Director of Child Health*
*Saskatchewan Department of Public Health*
*Regina, Saskatchewan*

THE dramatic decline in infant mortality over the past three decades, in this country and in other lands with a similar social and economic development, is well known. This reduction in infant mortality has become the hallmark of both public health and social progress. International comparisons are made to show the favourable rates in developed, advanced countries like Canada, as against the excessively high amount of infant loss in underdeveloped countries. Moreover, the increase in life expectancy in a country such as ours is in large measure due to increased survival in the early years.

Within the short period of 20 years we have witnessed a sharp decline in infant deaths. The rates in Saskatchewan and in Canada as a whole have declined approximately 50 per cent during that time. But there is often a tendency to become complacent about this accomplishment. We tend to forget that progress in preventing infant deaths from infectious agents, through epidemiological and chemotherapeutic control, has not been matched by similar progress with other non-infectious causes of death. And these latter causes of infant loss operate with particular force during the first days and hours of infant life.

Because of the lag in its decline, the natal day mortality rate is becoming increasingly important as a part of the residual infant mortality. From 1931 to 1952 the natal day death rate (under one day) in Saskatchewan declined from 14.5 per 1,000 live births to 9.6, a drop of 34 per cent. During the same period the post natal day mortality rate (1–27 days) and the post neonatal

Presented at the Vital and Health Statistics Section, forty-second annual meeting of the Canadian Public Health Association, held in Quebec May 31–June 2, 1954.

rate (1–11 months) showed a much greater decline—64 per cent and 54 per cent respectively.

While deaths ascribed to prematurity dropped to some extent from 1931 to 1949, they comprised about the same proportion of total infant deaths throughout this period. This is indicated in Table 1 which also demonstrates that among natal day deaths, prematurity was the cause in about two-thirds of the total, with only minor fluctuations over 20 years. The apparent drop in the 1952 rate for immaturity (the term which is now widely used) is due to the effect of the Sixth Revision of the International Classification of Diseases, Injuries and Causes of Death which was put into use in 1950. This revision differs from the older ones in two respects as far as the measurement of immaturity is concerned. First, the physician is now generally responsible for deciding the underlying cause and second, the classification itself has been modified.

TABLE I

IMMATURITY (OR PREMATURITY) AS A CAUSE OF INFANT MORTALITY, SASKATCHEWAN, 1931–52

| Year | Immature (premature) deaths | | | Natal day immature deaths | |
|---|---|---|---|---|---|
| | No. | Rate per 1,000 live births | % of total infant deaths | No. | % of all natal day deaths |
| 1931 | 376 | 17.6 | 25.7 | 206 | 66.5 |
| 1936 | 275 | 14.4 | 26.7 | 139 | 71.3 |
| 1941 | 223 | 12.1 | 23.6 | 107 | 56.9 |
| 1946 | 250 | 11.7 | 24.9 | 133 | 61.0 |
| 1949 | 241 | 11.1 | 28.9 | 135 | 63.7 |
| 1952* | 144 | 6.4 | 18.3 | 94 | 43.5 |

*Based on use of International Classification of Diseases, Injuries and Causes of Death (6th Revision, 1948); "immaturity" for 1952 includes 774–776 (see text).

The combined effect of these two changes is to render the 1952 figures non-comparable with the earlier data. Through the use of comparability ratios, however, it is possible to relate rates for immaturity unqualified and diseases of early infancy with the former categories of prematurity and diseases peculiar to the first year (1).

Another approach under the new conditions of the sixth revision is to obtain a figure for "total" mortality from immaturity (Table II). By this means deaths from immaturity alone, which includes codes 774 to 776 of the new classification, are combined with deaths from other diseases of early infancy when immaturity is mentioned on the death registration. The result is to produce a "total" immaturity death rate for non-Indians of 12.3 per 1,000 live births in 1952. These deaths formed over 45 per cent of all non-Indian infant deaths and 80 per cent of all natal day deaths, figures considerably in excess of those for the years before the sixth revision was in use.

Because of the great variation among physicians in their understanding and use of the terms *immaturity* or *prematurity*, one cannot be certain that this "total" rate for immature mortality shown in Table II represents the actual

TABLE II

"TOTAL" MORTALITY FROM IMMATURITY SASKATCHEWAN, 1952

| | Total | Non-Indian | Indian |
|---|---|---|---|
| *All infant deaths:* | | | |
| Number | 787 | 573 | 214 |
| Rate per 1,000 live births | 34.8 | 26.9 | 164.5 |
| *Immature deaths:* | | | |
| "Total" number | 281 | 262 | 19 |
| Immaturity unqualified (774–776) | 144 | 134 | 10 |
| Other diseases of early infancy with mention of immaturity (760.5–773.5) | 137 | 128 | 9 |
| Rate per 1,000 live births | 12.4 | 12.3 | 14.6 |
| Per cent of all infant deaths | 35.7 | 45.7 | 8.9 |
| *Natal day immature deaths:* | | | |
| "Total" number | 171 | 164 | 7 |
| Per cent of all natal day deaths | 79.2 | 80.0 | 63.7 |

state of affairs. A true picture of mortality and survival among immatures can only be derived from an analysis of the death experience among infants born with a known birth weight of 5½ pounds or less.

At this point a brief comment about infant mortality among Indians in Saskatchewan as revealed in Table II should be made, although this study is concerned with non-Indian data only. The overall infant mortality rate of 164.5 for Indians is almost seven times the rate for the rest of the population and should occasion some alarm among those charged with responsibility for the care of these infants. Special note should be made that immaturity as a cause of infant mortality among Indian infants is essentially no different from non-Indians and the major causes of this excessive infant loss are primarily those conditions which are preventable.

*Method of Study*

On January 1, 1951 a revised Vital Statistics Act largely based upon a model act adopted by the Vital Statistics Council for Canada came into force in Saskatchewan. New regulations passed under this Act set forth a revision of the birth registration form which included provision for entering birth weight of every newborn. In our experience approximately 10 per cent of initial registrations fail to show an entry for birth weight. In each instance these are queried and in the great majority of cases birth weight is obtained.

The data for this study have been collected by matching birth and death registrations of all 1953 immature births (excluding Indians) where the infant weighed 5½ pounds (2,500 grams) or less. For all birth registrations of immatures and for the corresponding death certificates a number of attributes were chosen for analysis. Since data on total live births were not immediately available, incidence rates have been computed on the basis of 1953 birth data available from the statistics of the Saskatchewan Hospital Services Plan. Immatures born to non-residents are excluded, as are the small number of immatures of resident mothers born in out-of-province hospitals.

*Incidence*

The following data show the incidence of immaturity in 1953 for the province as a whole:

| | All immatures | Birth weight (gms.*) | | | |
|---|---|---|---|---|---|
| | | 1,000 or less | 1,001–1,500 | 1,501–2,000 | 2,001–2,500 |
| Number | 1,337 | 80 | 126 | 242 | 889 |
| Rate per 1,000 live births | 63.4 | 3.8 | 6.0 | 11.5 | 42.1 |
| Per cent of all immatures | 100.0 | 6.0 | 9.4 | 18.1 | 66.5 |

The rate of 63.4 per 1,000 live births or 6.3 per cent is of the same order as several other reported rates (2, 3, 4, 5). The above figures show a steadily increasing incidence with increasing birth weight. Only about 15 per cent of the 1,337 immatures were among the very small babies under 1,500 grams. This distribution by birth weight is essentially similar to the findings in Massachusetts in 1951 (2) and Tennessee in 1949 (5).

In Table III incidence of immaturity is shown for each of the health statistical areas in the province. These areas have been delineated for the purpose of analyzing vital and other health data on a regional basis. With minor exceptions they coincide with the health regions or local health units which have been organized or are yet to be established in Saskatchewan. The two main cities of Regina and Saskatoon, which have their own local health departments, are shown as separate areas.

*Birth weight equivalents: less than 1,000 gms. or less—2 lbs. 3 oz. or less; 1,001–1500 gms.—2 lbs. 4 oz.–3 lbs. 4 oz.; 1,501–2,000 gms.—3 lbs. 5 oz.–4 lbs. 6 oz.; 2,001–2,500 gms.—4 lbs. 7 oz.–5 lbs. 8 oz.

TABLE III

INCIDENCE OF IMMATURITY IN HEALTH STATISTICAL AREAS (HEALTH REGIONS), SASKATCHEWAN, 1953 (RATE PER 1,000 LIVE BIRTHS)

| Health statistical area* | All immatures | | Birth weight group (gms.) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1,000 or less | | 1,001-1,500 | | 1,501-2,000 | | 2,001-2,500 | |
| | No. | Rate | No. | Rate | No. | Rate | No. | Rate | No. | Rate |
| All areas— | 1,337 | 63.4 | 80 | 3.8 | 126 | 6.0 | 242 | 11.5 | 889 | 42.1 |
| Swift Current No. 1 | 80 | 60.4 | 5 | 3.8 | 10 | 7.6 | 17 | 12.8 | 48 | 36.2 |
| Assiniboia-Gravelbourg No. 2 | 30 | 43.1 | — | — | 3 | 4.3 | 5 | 7.2 | 22 | 31.6 |
| Weyburn-Estevan No. 3 | 80 | 60.5 | 5 | 3.8 | 6 | 4.6 | 17 | 12.8 | 52 | 39.3 |
| Regina Rural No. 5 | 119 | 60.1 | 6 | 3.0 | 12 | 6.1 | 16 | 8.1 | 85 | 42.9 |
| Moose Jaw No. 6 | 81 | 66.4 | 6 | 4.9 | 10 | 8.2 | 14 | 11.5 | 51 | 41.8 |
| Rosetown No. 7 | 70 | 63.9 | 3 | 2.7 | 8 | 7.3 | 11 | 10.1 | 48 | 43.8 |
| Saskatoon Rural No. 8 | 99 | 62.0 | 7 | 4.4 | 6 | 3.8 | 26 | 16.3 | 60 | 37.5 |
| Wadena-Humboldt No. 9 | 65 | 52.2 | 6 | 4.8 | 7 | 5.6 | 10 | 8.0 | 42 | 33.8 |
| Yorkton No. 10 | 94 | 48.0 | 5 | 2.6 | 7 | 3.6 | 14 | 7.1 | 68 | 34.7 |
| Melfort-Tisdale No. 11 | 101 | 68.2 | 6 | 4.1 | 12 | 8.1 | 21 | 14.2 | 62 | 41.8 |
| Prince Albert No. 12 | 97 | 67.3 | 3 | 2.1 | 6 | 4.2 | 15 | 10.4 | 73 | 50.6 |
| North Battleford No. 13 | 117 | 67.6 | 6 | 3.4 | 9 | 5.2 | 19 | 11.0 | 83 | 48.0 |
| Meadow Lake No. 14 | 22 | 62.7 | — | — | 3 | 8.5 | 5 | 14.2 | 14 | 40.0 |
| Regina City No. 16 | 160 | 80.0 | 10 | 5.0 | 15 | 7.5 | 28 | 14.0 | 107 | 53.5 |
| Saskatoon City No. 17 | 105 | 64.6 | 11 | 6.8 | 9 | 5.5 | 20 | 12.3 | 65 | 40.0 |

*Seventeen immatures (non-Indian) were born in the Northern Administration District, Health Service Area No. 15; this number and corresponding rates are not shown because of an incomplete count of total live births in this area.

With two exceptions the rates of immaturity in the various areas differ little from the province-wide average. The exceptions are area No. 2 with the lowest rate of 43.1 and area No. 16 (Regina City) with the highest rate of 80.1 per 1,000 live births. The distributions of incidence by birth weight groups for the various areas reveal little significant variation. When relative incidence in urban and rural areas is examined in Table IV, the rates in cities and towns with populations of 1,000 and over are significantly greater than the rate for rural areas. Once again per cent distribution by weight groups has a common pattern for urban and rural areas.

TABLE IV

URBAN-RURAL INCIDENCE OF IMMATURITY, SASKATCHEWAN, 1951

| Residence of mother | Birth weight group (gms.) | | | | |
|---|---|---|---|---|---|
| | All immatures | 1,000 or less | 1,001–1,500 | 1,501–2,000 | 2,001–2,500 |
| | Number | | | | |
| Province | 1,337 | 80 | 126 | 242 | 889 |
| Cities | 423 | 28 | 44 | 74 | 277 |
| Towns (1,000+) | 139 | 10 | 11 | 24 | 94 |
| Rural | 775 | 42 | 71 | 144 | 518 |
| | Rate per 1,000 live births | | | | |
| Province | 63.4 | 3.8 | 6.0 | 11.5 | 42.1 |
| Cities | 74.7 | 4.9 | 7.8 | 13.1 | 48.9 |
| Towns (1,000+) | 95.3 | 6.9 | 7.5 | 16.5 | 64.4 |
| Rural | 55.4 | 3.0 | 5.1 | 10.3 | 37.0 |
| | Per cent distribution | | | | |
| Province | 100.0 | 6.0 | 9.4 | 18.1 | 66.5 |
| Cities | 100.0 | 6.6 | 10.4 | 17.5 | 65.5 |
| Towns (1,000+) | 100.0 | 7.2 | 7.9 | 17.3 | 67.6 |
| Rural | 100.0 | 5.4 | 9.2 | 18.6 | 66.8 |

Just what produces this urban-rural difference in total rates is not evident from this study. It is of interest to note some of the factors influencing the incidence of immaturity as found in the 1946 British Maternity Survey (6). This survey showed that the rate of immaturity increases with a decreased use of ante-natal services and was also greater among primiparae doing paid work. One might expect to find more primiparae entering employment in the cities and large towns of Saskatchewan; but on the other hand, ante-natal services are apt to be more accessible in these urban communities. Further study of the experience over more than one year might bring out the factors which operate to produce this difference.

Maternal age and birth order, which themselves are highly correlated, have an important bearing upon the incidence of immaturity. Young mothers, especially those under 20 years of age, have by far the highest rates (Table V).

The incidence decreases with increasing maternal age until age 35 years is reached. It is particularly noteworthy that the young group of mothers (under 25) gave birth to the lowest proportion of very small babies (under 1,000 grams) and consequently to the largest proportion of babies at the upper range of immaturity.

TABLE V

INCIDENCE OF IMMATURITY BY MATERNAL AGE, SASKATCHEWAN, 1953

| Age group | All immatures | | Birth weight group (gms.) | | | |
|---|---|---|---|---|---|---|
| | No. | Rate per 1,000 live births | 1,000 or less | 1,001–1,500 | 1,501–2,000 | 2,001–2,500 |
| | | | Number | | | |
| All ages | 1,337 | 63.4 | 80 | 126 | 242 | 889 |
| Less than 20 | 128 | 91.9 | 3 | 11 | 23 | 91 |
| 20–24 | 410 | 68.2 | 20 | 40 | 69 | 281 |
| 25–29 | 369 | 60.7 | 29 | 39 | 70 | 231 |
| 30–34 | 250 | 56.2 | 17 | 22 | 39 | 172 |
| 35–39 | 133 | 56.8 | 9 | 10 | 32 | 82 |
| 40 or more | 47 | 57.1 | 2 | 4 | 9 | 32 |
| | Per cent distribution | | | | | |
| All ages | 100.0 | | 6.0 | 9.4 | 18.1 | 66.5 |
| Less than 20 | 100.0 | | 2.3 | 8.6 | 18.0 | 71.1 |
| 20–24 | 100.0 | | 4.9 | 9.8 | 16.8 | 68.5 |
| 25–29 | 100.0 | | 7.8 | 10.6 | 19.0 | 62.6 |
| 30–34 | 100.0 | | 6.8 | 8.8 | 15.6 | 68.8 |
| 35–39 | 100.0 | | 6.8 | 7.5 | 24.1 | 61.6 |
| 40 or more | 100.0 | | 4.3 | 8.5 | 19.1 | 68.1 |

When the data are grouped by birth order (Table VI) the expected relationship is found—incidence decreasing with rising birth order. The incidence among the first-born was 81.2 per 1,000 live births dropping to 53.3 for birth order of five or more. In this study no attempt has been made to ascertain which of the factors of maternal age and birth order is the dominant one. Workers in Birmingham (7) have found that the significant variable was parity when related to birth weight once maternal age was fixed.

If adequate ante-natal care and proper obstetrical management are capable of reducing the incidence of immaturity, it would appear that such measures would be most productive when directed to young mothers and to primiparae.

*Mortality Experience*

The group of immatures born in 1953 was followed for a period of three months after the end of the year in order to obtain data beyond the neonatal period. From Table VII it is seen that mortality drops off very sharply for infants older than 27 days. Of all deaths in the 3-month period, 93.5 per cent occurred during the neonatal period. Throughout the rest of this mortality analysis, neonatal deaths alone will be considered.

TABLE VI

INCIDENCE OF IMMATURITY BY BIRTH ORDER, SASKATCHEWAN, 1953

| Birth order | All immatures | | Birth weight group (gms.) | | | |
|---|---|---|---|---|---|---|
| | Number | Rate per 1,000 live births | 1,000 or less | 1,001–1,500 | 1,501–2,000 | 2,001–2,500 |
| | | | Number | | | |
| Total | 1,337 | 63.4 | 80 | 126 | 242 | 889 |
| 1 | 461 | 81.2 | 22 | 44 | 69 | 326 |
| 2 | 333 | 59.9 | 19 | 24 | 55 | 235 |
| 3 | 215 | 52.8 | 20 | 23 | 40 | 132 |
| 4 | 146 | 61.4 | 6 | 17 | 39 | 84 |
| 5+ | 182 | 53.3 | 13 | 18 | 39 | 112 |
| | Per cent distribution | | | | | |
| Total | 100.0 | | 6.0 | 9.4 | 18.1 | 66.5 |
| 1 | 100.0 | | 4.8 | 9.5 | 15.0 | 70.7 |
| 2 | 100.0 | | 5.7 | 7.2 | 16.5 | 70.6 |
| 3 | 100.0 | | 9.3 | 10.7 | 18.6 | 61.4 |
| 4 | 100.0 | | 4.1 | 11.6 | 26.7 | 57.6 |
| 5+ | 100.0 | | 7.1 | 9.9 | 21.4 | 61.6 |

TABLE VII

MORTALITY OF IMMATURES BY BIRTH WEIGHT UP TO AGE OF 3 MONTHS, SASKATCHEWAN, 1953

| | All immature deaths | Birth weight groups (gms.) | | | |
|---|---|---|---|---|---|
| | | 1,000 or less | 1,001–1,500 | 1,501–2,000 | 2,001–2,500 |
| | Number | | | | |
| Total | 277 | 78 | 84 | 55 | 60 |
| Neonatal | 259 | 78 | 79 | 51 | 51 |
| 28 days–3 months | 18 | — | 5 | 4 | 9 |
| | Per cent mortality | | | | |
| Total | 20.7 | 97.5 | 66.7 | 22.7 | 6.7 |
| Neonatal | 19.4 | 97.5 | 62.7 | 21.1 | 5.7 |
| 28 days–3 months | 1.3 | — | 4.0 | 1.6 | 1.0 |

Of the 1,337 immature births, the neonatal per cent mortality was 19.4.* Both the Massachusetts and Tenessee studies, referred to earlier, showed per cent mortality rates of 20.1 and 21.0 respectively among immatures with essentially the same birth weight distributions.

The expected relationship of increased mortality to decreased birth weight is evident from our data. The critical point for survival is a birth weight of

*Equivalent to 12.3 neonatal immature deaths per 1,000 live births; in this study mortality rates based on *immature* live births rather than *total* live births have been used.

1,500 grams. For all infants below this weight the mortality rate was 8½ times greater than for infants above this weight level.

Although the numbers involved in this one year study are small, some differences in regional mortality rates in the various health statistical areas are revealed (Table VIII). In most cases these differences are not significant and in those areas where rates are somewhat higher than the provincial average, it was found that slightly greater proportions of babies under 1,500 grams were born. Areas with lower rates had fewer very small babies.

TABLE VIII

NEONATAL MORTALITY OF IMMATURES BY HEALTH STATISTICAL AREAS (HEALTH REGIONS), SASKATCHEWAN, 1953

| Health statistical area | Neonatal deaths | |
|---|---|---|
| | Number | Rate per 100 immatures |
| All areas— | 259 | 19.4 |
| Swift Current No. 1 | 21 | 26.3 |
| Assiniboia-Gravelbourg No. 2 | 4 | 13.3 |
| Weyburn-Estevan No. 3 | 15 | 18.8 |
| Regina Rural No. 5 | 23 | 19.3 |
| Moose Jaw No. 6 | 25 | 30.9 |
| Rosetown No. 7 | 14 | 20.0 |
| Saskatoon Rural No. 8 | 20 | 20.2 |
| Wadena-Humboldt No. 9 | 11 | 16.9 |
| Yorkton No. 10 | 15 | 16.0 |
| Melfort-Tisdale No. 11 | 20 | 19.8 |
| Prince Albert No. 12 | 11 | 11.3 |
| North Battleford No. 13 | 24 | 20.5 |
| Meadow Lake No. 14 | 2 | 9.1 |
| Northern Administration District No. 15 | 7 | 41.2 |
| Regina City No. 16 | 23 | 14.4 |
| Saskatoon City No. 17 | 24 | 22.9 |

Of special interest is the low mortality rate of 14.4 for Regina City, the place where the incidence of immaturity (80.1 per 1,000 live births) was highest. Moreover, this urban area had the same weight distribution of immature births as the province as a whole.

This favourable experience in one large city was not sufficient to influence the total urban rate when compared with the overall rate for rural areas. The small differences between cities, towns, and rural areas observed in Table IX are not significant. The distribution of per cent mortality in the various weight groups is essentially similar in town and country. One might have predicted that the rate of survival would be more favourable in the combined group of cities with their larger hospitals and more experienced personnel, but these data suggest that no basic difference exists.

Coincident with this finding is the observation that mortality among immatures born in larger hospitals is much the same as among those born in small institutions. Table X sets out neonatal immature deaths for hospitals of different sizes measured according to the annual number of live births. What appears to be a slightly more favourable mortality rate among immatures born in hospitals with 500–999 births per annum is not statistically significant.

TABLE IX

NEONATAL MORTALITY OF IMMATURES IN URBAN AND RURAL AREAS, SASKATCHEWAN, 1953

| Residence of mother | All immature deaths | Birth weight group (gms.) | | | |
|---|---|---|---|---|---|
| | | 1,000 or less | 1,001–1,500 | 1,501–2,000 | 2,001–2,500 |
| | Number | | | | |
| Total | 259 | 78 | 79 | 51 | 51 |
| Cities | 80 | 27 | 27 | 11 | 15 |
| Towns (1,000+) | 31 | 10 | 7 | 8 | 6 |
| Rural | 148 | 41 | 45 | 32 | 30 |
| | Per cent mortality | | | | |
| Total | 19.4 | 97.5 | 62.7 | 21.1 | 5.7 |
| Cities | 18.9 | 96.4 | 61.4 | 14.9 | 5.4 |
| Towns (1,000+) | 22.3 | 100.0 | 63.6 | 33.3 | 6.4 |
| Rural | 19.1 | 97.6 | 63.4 | 22.2 | 5.8 |

Moreover, the per cent distribution of immatures by weight at birth does not differ to any extent in the various hospital groups and therefore does not influence this comparison.

The group of largest hospitals, which are located in the two main cities, cared for 364 immature infants of which 265 were resident births (see Table III). We have found that the mortality rate for resident immatures in the two cities combined was 17.7 compared with 24.2 for the non-resident group. Just how many of this latter group were delivered in these hospitals and how many were transferred after birth is not known. In any event even with the exclusion of non-resident births the general finding regarding relative mortality in the various sized hospitals remains a valid one.

All of the group of larger hospitals with an excess of 500 births annually are equipped with incubators. But some of the smaller hospitals were not so equipped and this fact provided the basis for the comparison in Table XI. What appears to be a slightly lower immature death rate in the hospitals without incubators is not statistically significant. Again, the observation can be made that the very small babies under 1,500 grams have a more favourable survival experience when cared for inside an incubator while the reverse is true for the "heavier" immatures. However, the figures are too small to allow a firm conclusion; nevertheless this point is worthy of more intensive study. Admittedly an analysis based upon the mere presence or absence of incubators is a crude one. There are many other factors involved in the proper care of immatures including the correct use of incubators by trained personnel, the promptness with which the babies are placed in them, the skill used in feeding and the maintenance of oxygen support through a free airway.

It was thought that there might be some virtue in analyzing the seasonal variation in neonatal mortality of immatures. It is conceivable that during severe cold weather, which is frequently seen in Saskatchewan, hospitals

TABLE X

NEONATAL MORTALITY OF IMMATURES BY HOSPITAL SIZE (NUMBER OF LIVE BIRTHS PER YEAR), SASKATCHEWAN, 1953

| Hospital size | All immatures* | Birth weight group (gms.) | | | |
|---|---|---|---|---|---|
| | | 1,000 or less | 1,001–1,500 | 1,501–2,000 | 2,001–2,500 |
| | Number of births | | | | |
| All hospitals | 1,315 | 79 | 124 | 235 | 877 |
| 1,000 births or more | 364 | 29 | 37 | 61 | 237 |
| 500–999 births | 120 | 8 | 11 | 21 | 80 |
| 100–499 births | 516 | 28 | 50 | 84 | 354 |
| Less than 100 births | 315 | 14 | 26 | 69 | 206 |
| | Number of deaths | | | | |
| All hospitals | 254 | 77 | 78 | 48 | 51 |
| 1,000 births or more | 71 | 28 | 20 | 10 | 13 |
| 500–999 births | 19 | 8 | 6 | 3 | 2 |
| 100–499 births | 108 | 27 | 33 | 24 | 24 |
| Less than 100 births | 56 | 14 | 19 | 11 | 12 |
| | Per cent mortality | | | | |
| All hospitals | 19.3 | 97.5 | 62.9 | 20.4 | 5.8 |
| 1,000 births or more | 19.5 | 96.6 | 54.1 | 16.4 | 5.5 |
| 500–999 births | 15.8 | 100.0 | 54.5 | 14.3 | 2.5 |
| 100–499 births | 20.9 | 96.4 | 66.0 | 28.6 | 6.8 |
| Less than 100 births | 17.8 | 100.0 | 73.1 | 15.9 | 5.8 |

*Five deaths occurred among 22 immature births which took place outside hospital.

would have difficulty in constantly protecting immatures from fluctuations in temperature. The data revealed a higher per cent mortality during the winter months. The high winter rate of 24.6 is significantly greater than the low spring rate of 15.8 although a larger proportion of babies under 1,500 grams were born during the winter than during the spring months.

The chances of survival for small babies is consistently poor in all seasons; the winter disadvantage seems to result from a greater relative mortality in the 1,501–2,000 gram group.* A more detailed study of the role of pneumonia and other infections among immatures, recognized and unrecognized, might be revealing.

The more frequent occurrence of immatures among multiple births is a well recognized phenomenon. In this study the incidence of immaturity among multiple live births was almost nine times the rate among single births. When we consider the relationship of survival to plurality, we find that twins and triplets have approximately the same chance as singletons. The slight difference in the rates for all weights combined in Table XII—21.1 as against 19.0—is not a significant one and is attributable to the somewhat greater proportion of very small babies among the plural-born immatures. In other words, the

*29.2 per 1,000 immatures in winter compared with 14.3 in spring.

TABLE XI

NEONATAL MORTALITY OF IMMATURES IN SMALLER HOSPITALS WITH AND WITHOUT INCUBATORS, SASKATCHEWAN, 1953

| Hospital size | All immatures | Birth weight group (gms.) | | | |
|---|---|---|---|---|---|
| | | 1,000 or less | 1,001–1,500 | 1,501–2,000 | 2,001–2,500 |
| | Number of births | | | | |
| Less than 499 births | 831 | 42 | 76 | 153 | 560 |
| With incubator | 723 | 39 | 66 | 130 | 488 |
| Without incubator | 108 | 3 | 10 | 23 | 72 |
| | Number of deaths | | | | |
| Less than 499 births | 164 | 41 | 52 | 35 | 36 |
| With incubator | 145 | 38 | 44 | 30 | 33 |
| Without incubator | 19 | 3 | 8 | 5 | 3 |
| | Per cent mortality | | | | |
| Less than 499 births | 19.7 | 97.6 | 68.4 | 22.9 | 6.4 |
| With incubator | 20.1 | 97.4 | 66.7 | 23.1 | 6.8 |
| Without incubator | 17.6 | 100.0 | 80.0 | 21.7 | 4.2 |

operative influence on survival is birth weight rather than the biological accident of plurality per se.

The first hour and the first day of life are known to be hazardous for immature infants. Table XIII does not reveal an unduly high mortality in the first hour (6.2 per cent) although the period immediately after delivery is a slightly more critical time for the very small babies under 1,000 grams. Once the initial shock of human interference and of the new environment is overcome, survival depends to a great extent on sustaining the infant through the first week. A great deal hangs in the balance during the first day especially for the smallest babies.

One writer in this field (8) has questioned the proposition that any infant can die of "prematurity" any more than it can die of "neonatality". Immaturity is conceived only as a function of uterogestation. There is probably a considerable element of truth to this idea but a fuller understanding of all the contributing factors leading to death among immatures will come only with reasonably complete autopsies on all deaths. For this study information was not readily available on the proportions of autopsies performed on immatures who failed to survive.

Only 25 per cent of all adult deaths in general hospitals in Saskatchewan in 1953 were examined post-mortem and it is unlikely that any greater proportion of deaths among immatures was subject to pathological study. The data in Table XIV support this view. Almost 50 per cent of deaths are coded as immaturity unqualified and the percentage ascribed to this cause is higher among

TABLE XII

NEONATAL MORTALITY AMONG SINGLE AND MULTIPLE IMMATURE BIRTHS, SASKATCHEWAN, 1953

| | All immatures | Birth weight group (gms.) | | | |
|---|---|---|---|---|---|
| | | 1,000 or less | 1,001–1,500 | 1,501–2,000 | 2,001–2,500 |
| | Number of births | | | | |
| Single | 1,105 | 63 | 93 | 190 | 759 |
| Male | 529 | 28 | 48 | 99 | 354 |
| Female | 576 | 35 | 45 | 91 | 405 |
| Multiple | 232 | 17 | 33 | 52 | 130 |
| Male | 119 | 7 | 18 | 25 | 69 |
| Female | 113 | 10 | 15 | 27 | 61 |
| | Number of neonatal deaths | | | | |
| Single | 210 | 62 | 59 | 45 | 44 |
| Male | 113 | 27 | 32 | 29 | 25 |
| Female | 97 | 35 | 27 | 16 | 19 |
| Multiple | 49 | 16 | 20 | 6 | 7 |
| Male | 28 | 6 | 13 | 5 | 4 |
| Female | 21 | 10 | 7 | 1 | 3 |
| | Per cent mortality | | | | |
| Single | 19.0 | 98.4 | 63.4 | 23.7 | 5.8 |
| Male | 21.3 | 96.4 | 66.7 | 29.3 | 7.1 |
| Female | 16.8 | 100.0 | 60.0 | 17.6 | 4.7 |
| Multiple | 21.1 | 94.1 | 60.6 | 11.5 | 5.4 |
| Male | 23.5 | 85.7 | 72.2 | 20.0 | 5.8 |
| Female | 18.9 | 100.0 | 46.6 | 3.7 | 4.9 |

infants under 1,500 grams. Postnatal asphyxia and atelectasis and birth injury represent the next leading causes of mortality, together accounting for almost 30 per cent of all fatal cases. Congenital malformations and other diseases of early infancy form a smaller part of all deaths. Undoubtedly abnormalities of pulmonary function and birth injury are the two most important causes and if more were known about the "immaturity unqualified" group many of them could be expected to fall into these categories.

The figures in Table XV show the changing role of the different causes at various ages in the neonatal period. Immaturity unqualified is fairly constant during each interval. Postnatal asphyxia and atelectasis claim their greatest toll during the first week dropping markedly after that. Injury at birth follows the same pattern. Congenital malformations and other causes, especially infections, increase in importance towards the latter part of the neonatal period.

These findings on the mortality experience of immatures would confirm that the critical factors are pulmonary distress and birth injury affecting the smaller babies who die in the first day and first week of life without even having left hospital.

TABLE XIII

NEONATAL MORTALITY OF IMMATURES BY AGE AT DEATH, SASKATCHEWAN, 1953

| Age at death | All immatures | Birth weight groups (gms.) | | | |
|---|---|---|---|---|---|
| | | 1,000 or less | 1,001–1,500 | 1,501–2,000 | 2,001–2,500 |
| Total | 259 | 78 | 79 | 51 | 51 |
| Under 1 hr. | 16 | 6 | 4 | 3 | 3 |
| 1–23 hrs. | 114 | 46 | 27 | 21 | 20 |
| 1–6 days | 103 | 25 | 37 | 26 | 15 |
| 7–27 days | 26 | 1 | 11 | 1 | 13 |
| | Per cent mortality | | | | |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Under 1 hr. | 6.2 | 7.7 | 5.1 | 5.9 | 5.9 |
| 1–23 hrs. | 44.0 | 59.0 | 34.2 | 41.2 | 39.2 |
| 1–6 days | 39.8 | 32.0 | 46.8 | 51.0 | 29.4 |
| 7–27 days | 10.0 | 1.3 | 13.9 | 1.9 | 25.5 |

TABLE XIV

NEONATAL MORTALITY BY CAUSE OF DEATH, SASKATCHEWAN, 1953

| Cause of death* | All immatures | Birth weight group (gms.) | | | |
|---|---|---|---|---|---|
| | | 1,000 or less | 1,001–1,500 | 1,501–2,000 | 2,001–2,500 |
| | Number of neonatal deaths | | | | |
| All causes | 259 | 78 | 79 | 51 | 51 |
| Immaturity unqualified (774–776) | 126 | 52 | 46 | 17 | 11 |
| Postnatal asphyxia and atelectasis (762) | 43 | 10 | 10 | 13 | 10 |
| Injury at birth (760–761) | 33 | 11 | 8 | 7 | 7 |
| Congenital malformations (750–759) | 16 | 1 | 2 | 3 | 10 |
| Other diseases of early infancy (763, 764, 765–768, 769, 770–771, 772 and 773) | 36 | 4 | 11 | 11 | 10 |
| All other (residual) | 5 | — | 2 | — | 3 |
| | Per cent distribution | | | | |
| All causes | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Immaturity unqualified (774–776) | 48.6 | 66.7 | 58.2 | 33.3 | 21.6 |
| Postnatal asphyxia and atelectasis (762) | 16.6 | 12.8 | 12.7 | 25.5 | 19.6 |
| Injury at birth (760–761) | 12.8 | 14.1 | 10.2 | 13.7 | 13.7 |
| Congenital malformations (750–759) | 6.2 | 1.3 | 2.5 | 5.9 | 19.6 |
| Other diseases of early infancy (763, 764, 765–768, 769, 770–771, 772 and 773) | 13.9 | 5.1 | 13.9 | 21.6 | 19.6 |
| All other (residual) | 1.9 | — | 2.5 | — | 5.9 |

*Code numbers according to the International Statistical Classification of Diseases, Injuries and Causes of Death (6th Revision, 1948).

TABLE XV

CAUSES OF NEONATAL MORTALITY BY AGE AT DEATH, SASKATCHEWAN, 1953

| Cause of death | All immatures | Age at death | | | |
|---|---|---|---|---|---|
| | | Under 1 hr. | 1–23 hrs. | 1–6 days | 7–27 days |
| | Number neonatal deaths | | | | |
| All causes | 259 | 16 | 114 | 103 | 26 |
| Immaturity unqualified (774–776) | 126 | 7 | 61 | 47 | 11 |
| Postnatal asphyxia and atelectasis (762) | 43 | 3 | 18 | 21 | 1 |
| Injury at birth (760–761) | 33 | 4 | 19 | 10 | — |
| Congenital malformations (750–759) | 16 | — | 5 | 9 | 2 |
| Other diseases of early infancy (763, 764, 765–768, 769, 770–771, 772 and 773) | 36 | 2 | 10 | 15 | 9 |
| All other (residual) | 5 | — | 1 | 1 | 3 |
| | Per cent distribution | | | | |
| All causes | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Immaturity unqualified (774–776) | 48.6 | 43.8 | 53.5 | 45.6 | 42.3 |
| Postnatal asphyxia and atelectasis (762) | 16.6 | 18.7 | 15.8 | 20.4 | 3.9 |
| Injury at birth (760–761) | 12.8 | 25.0 | 16.6 | 9.7 | — |
| Congenital malformations (750–759) | 6.2 | — | 4.4 | 8.7 | 7.7 |
| Other diseases of early infancy (763, 764, 765–768, 769, 770–771, 772 and 773) | 13.9 | 12.5 | 8.8 | 14.6 | 34.6 |
| All other (residual) | 1.9 | — | 0.9 | 1.0 | 11.5 |

*Problems in the Care of Immatures*

The most effective way to reduce immature mortality would be to reduce the incidence and ultimately ensure the birth of only full-term babies of adequate weight. Such biological factors as plurality, however, will always result in a residuum of small babies despite any impact we might have upon reducing overall incidence. In general our understanding of how to prevent immaturity is quite limited and we are likely to be faced with substantial numbers of these small babies for some time to come.

Any newborn infant requires air, food, warmth and protection from infection. A normal thriving newborn can usually withstand varying degrees of deprivation. For the immature, particularly below 1,500 grams in weight, failure to meet the essentials even for short periods of time can prove fatal. The nutritional needs of the immature are unusual; his heat regulation and oxygenation mechanisms are inadequate; he lacks the vigour of the larger normal infant. It is of utmost importance that skillful and prompt care be available if these infants are to survive.

The problem of immature care in Saskatchewan is made complex by the fact that over 98 per cent of these infants are born in 161 hospitals scattered over 240,000 square miles. The large bulk of these hospitals (almost 70 per cent) are small units under 25 beds where less than 100 births occur annually. The only paediatricians in the province are located in the two largest cities.

For the most part then, there can be no direct paediatric supervision at the time of birth for at least 80 per cent of immature infants.

Certain steps have been taken in this province to improve the care of immature infants. In 1949 National Health Grants were used to purchase 79 small, portable, general duty incubators which were placed in main centres throughout the province. All hospitals were advised of the location of the incubators which were borrowed by other hospitals as needed. In addition, the air ambulance service was equipped with two special incubators. During 1953, additional incubators were ordered. All hospitals in Saskatchewan, regardless of size, now have the use of modern incubators. In addition, nursing schools have elaborate incubators for care of the smallest babies, and for teaching purposes.

During 1952 a number of paediatricians in Saskatchewan investigated the care of immature infants born in some of the larger hospitals. As a result preliminary plans have been drafted for the establishment of highly organized and well-staffed "premature centres". Such a project follows the recommendation of the American Academy of Pediatrics (9), that hospitals having at least 1,500 live births annually should have highly organized nurseries specially designed, equipped, and with specially trained staff to provide skilled care for immature infants. At the same time, paediatricians were being invited to present to district medical societies some of the common problems in management of newborn infants including immature infants.

Another important step was to introduce a training program for nurses in the care of immature infants. Beginning, in 1950 and continuing in 1951 and 1952, a nurse consultant from the Federal Division of Child and Maternal Health conducted a teaching program in which emphasis was placed upon the quality of nursing techniques and the adequacy of space and equipment for the care of immatures. In addition to field visits this consultant conducted a series of workshops in ten main centres attended by hospital and public health nurses.

Concurrently the health department took steps to establish inspection standards for nursing facilities. A nursing consultant on departmental staff periodically visits all hospitals to assess the application of these standards and provide advice for improvement.

## Summary and Conclusions

This epidemiological review of one year's experience with the incidence of mortality among immature infants provides ample evidence that we are faced with a substantial burden of immaturity which forms an important element of residual infant mortality in Saskatchewan.

Data derived from the matching of birth and death registrations, classified by birth weight, will yield more useful information than the usual analyses of vital statistics. Where possible other related findings on hospital morbidity and on the quality of care would aid considerably in isolating those corrective measures necessary to prevent needless deaths among these small infants.

In 1953 Saskatchewan had a province-wide immaturity incidence of 6.3 per cent with few significant regional differences. Incidence in cities and towns

with populations of 1,000 and over was significantly greater than in rural areas combined. The distribution of immatures by birth weight was essentially the same in these areas. Incidence was also seen to decrease with rising maternal age and increased birth order.

With our limited knowledge about the causes of immature births, control through preventing their occurrence is not likely to yield any reduction in the immediate future. Hope lies in improving the immature's chance of survival by directing our attack upon factors producing mortality.

This review demonstrates that the major variable in mortality is birth weight. Infants under 1,500 grams have a rate of mortality 8½ times that of infants 1,500–2,500 grams. Aside from the category "immaturity unqualified", abnormal pulmonary ventilation and birth injury were the leading causes producing their greatest toll among smaller infants in the first day following delivery. If these infants are to survive, skilled, prompt care supported by adequate modern facilities and equipment is essential. That facilities and equipment alone will not suffice tends to be borne out by this study which demonstrates no significant difference in survival among hospitals of different size, or among small hospitals with or without incubators.

The care of immatures in an agricultural province like Saskatchewan is complicated by its extreme rurality, the existence of a high proportion of small hospitals and the shortage of paediatric specialist services outside the two largest cities.

Some steps have been taken in this province—and admittedly they are only first steps—to improve standards of care and provide essential facilities. Much more is required if we are to improve the opportunity for survival of immatures.

REFERENCES

1. Brackett, A. F. and Price, B.: Nursing Outlook, 1953, *1*: 355.
2. Rice, R. G. *et al.*: New England J. Med., 1953, *248*: 1090-1097.
3. Crosse, V. M.: The Premature Baby. London: J. & A. Churchill, 1952, 137.
4. Duffield, T. J. *et al.*: The Child, 1940, *5*, 123.
5. Hutcheson, R. H. and Puffer, R. R.: Am. J. Pub. Health, 1951, *41*: 49.
6. Douglas, J. W. B.: J. Obst. and Gynaec., 1950, *57*: 143.
7. McKeown, T. and Gibson, J. R.: Brit. J. Social Med., 1951, *5*: 98.
8. Bundesen, H. N.: Natal Day Deaths, Chicago Health Department, 1953.
9. American Academy of Pediatrics: Standards and Recommendations for Hospital Care of Newborn Infants (Evanston, Ill.: 1954).

# Sight-Saving Classes

H. L. ORMSBY, M.D., F.R.C.S.[1]
AND W. S. AITCHISON, M.D.[2]

WITHIN the primary and secondary school systems, visually handicapped children create a problem. To ensure an education for these pupils, sight-saving classes have been organized in many of the large centres, and text-books printed in large type are available in smaller centres where special classes do not exist.

Sight-saving classes were originally organized, not only to facilitate learning, but to prevent visual deterioration in children whose eyes might suffer from the strain of school work. In myopia, for instance, it was the general belief until recently, that increase in the myopia was caused by eye strain. To-day, the advice given to parents of myopic children by most oculists is that short-sightedness is due to heredity and it may increase during the period of growth.

As a result of the re-organization of the Toronto sight-saving classes in the past two years, most myopic children have been returned to regular class rooms. It would now be more correct to refer to these groups as "classes for the visually-handicapped".

The upper limit of vision for admission to a sight-saving class cannot be stated categorically, since much depends upon the child's ability to maintain his grades in a regular class room in competition with children of his own age. Vision which can be corrected to less than 20/40 in the better eye (Snellen Chart) has proven a useful standard for admission, since such a child usually has difficulty seeing letters on the blackboard. With the exception of some myopes who are wearing glasses with an under-correction for distance, a visual acuity of 20–50 is usually paralleled by an inability to read ordinary newsprint.

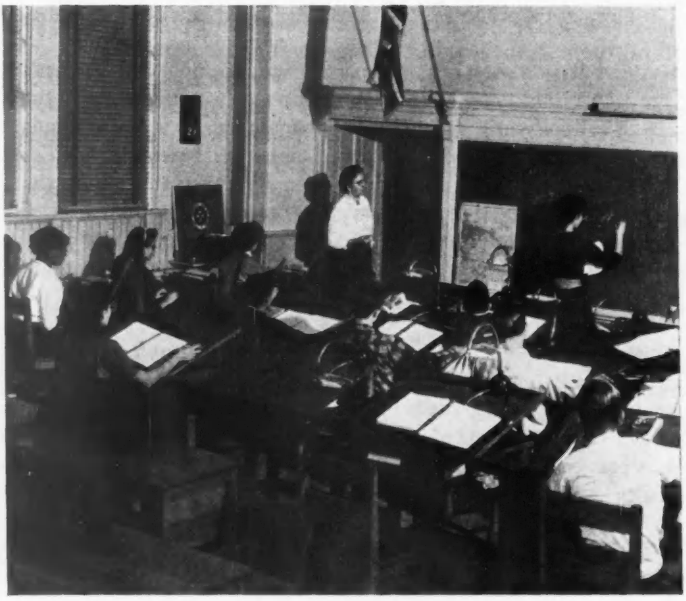
The lower limit for admission to a sight-saving class is generally accepted as 20/100 in the better eye. A child whose vision can be corrected to 20/200 or less is unlikely to make his way successfully in a sighted world, and should be considered a candidate for admission to one of the schools for the blind.

In Metropolitan Toronto, with a population in excess of 1,100,000, there are 147,365 children of primary school age, and 34,323 children in the secondary grades. In the four sight-saving classes in this area, there are 45 pupils. The eye defects in this group include buphthalmos, ectopia lentis, congenital nystagmus, colobomata of the choroid and retina, and optic atrophy. In none of these children is the eyesight likely to improve, in some it will remain unchanged, and for some the sight may fail. Even with the advantages offered in these special classes, only a small percentage of the students reach Grade X, and it is necessary to have only one senior sight-saving class teaching Grades VIII to X.

[1]Consulting Ophthalmologist, Department of Public Health, Toronto, Ontario.
[2]Associate Director, Division of Community Health Services, Department of Public Health, Toronto, Ontario.

*Visual Aids in Sight-Saving Classes*

Glasses, when necessary, must give the best possible vision for distance and near. During the re-organization of the sight-saving classes in 1953, many myopic children were found to be wearing glasses with inadequate corrections for distance. When they were provided with new glasses, most of these children were able to return to the regular classes. Two children with congenital dislocation of the lenses, who had never worn glasses, were given glasses which gave them distance vision of 20–50 in each eye. Previous neglect in these cases is difficult to account for, but demonstrates the need for special supervision of these classes.



Senior Sight Saving Class at Deer Park School, Toronto, Ontario.

Artificial lighting in regular school rooms seldom exceeds 30 foot-candles at the working surface, unless it is supplemented from outside sources. For normal children, the lighting from all sources in the average class room is adequate. In sight-saving class rooms the optimum illumination is considered to be 90 foot-candles at the working surface. This is maintained in the sight-saving classes in Toronto by means of fluorescent lighting at the ceiling and over the black boards, and the elimination of outside sources of light by means of venetian blinds. In the case of albino children, it has been shown experimentally that there is some discomfort in illuminated surroundings exceeding fifty foot-candles. These children experience no discomfort in class rooms with an illumination of 90 foot-candles as long as they are wearing tinted glasses.

Text-books printed in "Magnatype" are used throughout the sight-saving classes. These are available for most subjects taught in the primary and secon-

dary schools, and are obtained from the Department of Education of the Province of Ontario.

Magnifying lenses of various types are available to enlarge the print of textbooks at all desks in the sight-saving classes. In spite of the theoretical advantages of these magnifiers, few of the pupils will use them.

*The Problem of Multiple Defects in Children*

Visually handicapped children who also suffer from additional defects such as deaf-mutism or low intelligence, create a much greater problem for school authorities. Intelligence should be at a higher level in children with visual handicaps if they are to progress in school at a normal rate. An I.Q. of 75 or lower should preclude admission to a sight-saving class, for such a child will make little progress in learning and will only be a burden to the teacher.

Children with high intelligence, however, frequently make good progress in spite of their visual handicap, and may actually enter grades in advance of their age groups.

Visually handicapped children who have additional defects in hearing or speech, require careful study, and depending upon the degree of impairment in these senses, may be better placed in some other type of special class, using sight saving material.

*Results of Sight-Saving Class Instruction*

Individual instruction has been possible in the sight-saving classes by restricting the number of pupils to sixteen. In the past, many of the pupils in these classes were myopes who had little visual disability as long as they wore glasses. Since the removal of the myopes from these classes in 1953, the remaining pupils all have a major visual disability, and it has been found profitable to limit each class to twelve pupils.

Sight-saving class instruction now offers the visually handicapped child opportunities for education equal to or better than that of children in regular class rooms. A follow-up study of the graduating class of 1954 reveals that one boy has continued in school in an advanced grade; one has entered a College of Agriculture to study veterinary science, and the third has obtained a position as a shipper in a chocolate factory. Of the five girls, one is now taking a course as a nursing assistant; one is taking a course in business machines at a collegiate; and three are employed by departmental stores in Toronto.

# Sanitary Engineering in Saskatchewan

J. G. SCHAEFFER, M.A.Sc.
*Department of Public Health*
*Regina, Saskatchewan*

THE Prairie provinces have always been looked upon as the Dominion's wheat growing area, with a predominantly rural population. Although farming is still the major industry, there has been, in common with other parts of the Dominion, a noticeable shift of population to urban centres. In the province of Saskatchewan with which this article deals, this shift is due in large part to the intensification of farm mechanization during the past decade or more. In fact, the situation has become so alarming that the Legislature appointed a Royal Commission on Agriculture to study the problem and explore ways and means to reverse the trend if that appears desirable.

Farm mechanization introduces two factors. It reduces the man-hours of labour requirements and it demands large acreages for economical operation. Consequently, fewer people are required on the farms for the same productivity, and consolidation of small farms into large holdings spreads those fewer people over a larger area. This in turn increases the problem of access roads, rural electrification, rural schools and the provision and administration of health services and recreational facilities.

Various departments of government are concerned with the problem and every encouragement is given the farmer, and particularly his children, to stay on the land. The consolidation of schools and facilities for the transportation of pupils to a central school is an attempt to solve the rural school problem. Central Schools simplify school nursing services, but do not shorten the distances or reduce the area so far as home visits are concerned.

The modernization of farm homes has been stressed over the years and much has been accomplished in this respect. Until a few years ago only journeymen plumbers were permitted to make plumbing installations. The farmer had, and still has, difficulty obtaining the services of plumbers because there is more than enough work in the urban centres to keep them busy. When he is successful, the extra travel and time involved increases the cost to a point where the services are no longer attractive. The legislation has been amended so that the bona-fide home owner in rural areas may install his own plumbing. Of course all plumbing must be installed in accordance with the provincial plumbing regulations and is subject to test and to inspection by a representative of the Provincial Health Department.

The lack of electricity prevents complete modernization on many farms and probably contributes to a certain amount of indifference on the part of some rural dwellers. The supply of water under pressure, for example, cannot be accomplished satisfactorily except with electrically operated pumps. Added

to this draw-back is the problem of an adequate water supply of good quality. Much of the sub-surface water on the Prairies is highly mineralized. Magnesium and sodium sulphate are the predominant salts and water with a salt content of 2500 to 3500 parts per million is common. The consumers of such water seldom voice an objection so far as drinking qualities are concerned and are likely to be more critical of a less highly mineralized water whenever a switch is made. However, the use of these waters for general domestic purposes is decidedly limited. As a result many farm supplies are derived from surface run-off collected in a large dug-out. A well or reservoir is connected to the dug-out by a gravel filled trench, 15 to 20 feet or more in length which acts as a filter. The filtered water is usually of good quality.

An excessive amount of nitrates is frequently encountered in well water in the Province and this situation is not confined to any specific area. It is found in some supplies from all areas, and as experienced elsewhere, properly protected supplies are not necessarily immune. However, so much publicity has been given to the danger of using high nitrate water for infant feeding that the rural population at least is fully nitrate conscious. Probably the desire to know the nitrate content, as well as the mineral and bacterial quality, prompts the submission annually of more than 7,000 water samples to the provincial laboratory for examination and test. This service is free but samples are not examined for bacterial quality unless submitted in a special sterilized container supplied by the Department on request.

The rapid growth of some of our urban centres has given rise to the same difficulties experienced elsewhere in the Dominion. Adequate housing, school accommodation and public utilities are the major problems. In the three Prairie provinces there are only five urban centres with a population in excess of 50,000, but there are hundreds of small communities varying from incorporated villages of two or three hundred to towns of four thousand or more. (In Saskatchewan, a town may be incorporated as such if the population exceeds 500). Generally speaking, the larger the centre the greater is the growth. Paradoxically, some centres have declined in population within the last decade and some have remained static. We have a total of 379 incorporated villages with an average population of 240 and a maximum of 900. There are 99 incorporated towns varying in population from less than 200 to a maximum of 4,900. The former represent older towns which were incorporated during boom times and lost population almost immediately thereafter.

All the public waterworks and sewerage systems in the province are municipally owned and operated. There are 45 waterworks systems and 35 sewerage systems serving approximately 280,000 persons in a total population of about 840,000. A unique situation exists in four of our towns. Each operates a sewerage system without benefit of a waterworks system. One of these, a town of more than 2,000 population, has had a public sewerage system in use for 30 years. Sewage treatment is by the activated sludge method. The town is built over an excellent aquifer from which water can be obtained at any point at a depth of about 60 feet. Householders quickly took advantage of this fortunate situation and installed their own water supply and pressure system. In due course the problem of waste disposal and protection of the water supply

arose. To meet this problem the municipality installed a comprehensive sewerage system. The citizens are completely satisfied with the arrangement.

The other three towns operating a sewerage system only are somewhat smaller and a suitable water supply in quantity is not available except at excessive cost, or at least at greater cost than can be financed at present. Meanwhile, citizens have installed pressure systems utilizing roof water and water tanked to storage from dug-outs and other small surface supplies. This gradually aggravated the waste disposal problem and eventually a sewerage system was installed. A fifth municipality plans the installation of a sewerage system this year. In this case surface and seepage water is a big problem and a suitable water supply will be very costly. Rather than wait until such time when both systems can be financed, the sewerage system will be installed now and will provide certain immediate benefits. The town has a population of approximately 2,500. All these towns except the first mentioned hope to provide a waterworks system as soon as one can be financed.

With the exception of the two towns mentioned in the preceding paragraphs, all those of 2,000 population or more have both a waterworks and sewerage system. There are 19 towns with a population between 1,000 and 2,000. Of these, eight have both systems, three have water only and eight have neither. However, two with water only are installing sewers this year, and two with neither system will construct both this year. Only two incorporated towns under 1,000 population have a waterworks and a sewerage system. Eight have waterworks only and three have only a sewerage system. Of the 379 incorporated villages none has a sewerage system and only two have a waterworks system.

The shift of farm population to some of the larger villages and smaller towns has awakened an interest in modern facilities. Many retired farmers have moved to the urban centres and they want facilities which they could not or did not have on the farms. Furthermore, farm mechanization with resulting increased leisure time permits the establishment of homes in the urban centres from which farm operations are conducted. These people go to the towns because the amenities of life are considered to be better there. They naturally expect all the modern-day conveniences.

The demand for services has led to a renewed interest on the part of the local councils and many have paved the way for the early installation of waterworks and sewerage systems. Others are exploring the possibility of providing these services and have engaged consulting engineers to make the necessary survey and report. However, great as may be the desire, the accomplishment is a different matter. Current legislation restricts the capital indebtedness, for whatever purpose, which a municipality may incur to a percentage of the local assessment. Villages are limited to 10 percent and towns to 15 percent of the equalized assessment. This limitation, with present day construction costs, severely restricts the amount of construction which can be undertaken. Capital costs constitute those for water supply, treatment and supply mains, sewage treatment facilities, outfall sewers, etc. Unless the water supply and sewage disposal situation is favorable most of the smaller municipalities cannot install both a waterworks and sewerage system and stay within the

limitation. Furthermore, the legislation pertaining to villages does not permit the assessment of works against property abutting thereon. That means the entire cost must be charged to capital and there can be no local improvement assessment.

A recent innovation, now being widely adopted to reduce both capital and operating costs for sewerage systems, is the substitution of sewage lagoons for both primary and secondary sewage treatment. This method has worked out particularly well in North Dakota and adjoining States. There are three lagoons in operation in Saskatchewan and at least five more will be constructed this year. The artificial lagooning of raw sanitary sewage is a relatively new process. The lagoons consist of dyked areas of approximately one acre per 100 population. The water depth is maintained at about four to a maximum of five feet. Every opportunity is given for the breakdown of complex organic matter by natural agencies. Wind action provides mixing and aeration. Sunlight promotes photosynthesis by algae which in turn supply a super-abundance of oxygen. B.O.D., reductions have been found to be as high as 98 percent in the summer months, and even with an ice cover a B.O.D., of 60 percent or more is possible. Where there is an overflow, the effluent is usually much better than the quality of the receiving water. The cost of operation is practically nil. One of the largest installations of this type of which the author is aware, is at Jamestown, N.D. Jamestown has a population of 10,000.

Seven of the thirty-five municipalities operating a sewerage system have no treatment facilities. Twelve have only primary treatment. Three have sewage lagoons. Seven have activated sludge units and six have trickling filters, either standard or high-rate.

Neither surface nor sub-surface water in this Province contains any appreciable amount of fluorides. Where fluorides exist the amount does not exceed 0.2 ppm to 0.3 ppm. Five municipalities now fluoridate the communal water and a sixth expects to adopt the practice very soon. There are no Provincial regulations dealing with fluoridation and none are considered necessary. The Department has endorsed fluoridation and has arbitrarily set the upper limit at 1.2 ppm of total fluoride. Sodium fluoride is the chemical used by three municipalities and sodium silico fluoride by the other two.

About two thirds of the municipal water supplies are from surface and the remainder from sub-surface sources. All surface supplies are chlorinated, and with one exception are filtered. Saskatoon and Regina, the two largest cities obtain their requirements from surface and sub-surface supplies respectively. However, Regina is about to obtain a part of its supply from a surface source known as Buffalo Pound, a shallow lake in a wide section of the Qu'Appelle River. The lake is north of the city of Moose Jaw and will supply that city as well. A complete treatment plant has been constructed near the lake and has an initial capacity of six million gallons per day. Water from Regina will be pumped through 35 miles of 36 inch pipeline, and to Moose Jaw through 12 miles of 24 inch pipeline.

There are no municipal water softening plants in operation in the Province, but a zeolite softening plant is under construction in one of the smaller urban centres.

There are very few flowing streams utilized as a water supply, and stream pollution is not a problem at present. However, mention should be made of the serious pollution which occurred in the north branch of the Saskatchewan River during the winter of 1953–54. This pollution originated in the adjoining province of Alberta from the vicinity of the city of Edmonton. It adversely affected the water supply at Prince Albert, Saskatchewan, which is some 450 river miles downstream and was noticeable even as far away as The Pas, Manitoba. Control measures adopted by industries around Edmonton and close supervision by the provincial health authorities have corrected the condition; at least to a degree which is no longer significant at the present time.

# The Phenomenon of Treponemal Agglutination for the Serodiagnosis of Syphilis

## AN INTERIM REPORT (PART I)

ROBERT M. CAIN, Lt. M.S.C., U.S.N.R.
AND
DEAN C. WATSON, H.M.3., U.S.N.
*Naval Medical School*
*Bethesda, Maryland*

THE methods proposed in the preliminary report on this subject (1) have been restudied and have undergone revision with the thought in mind of making the agglutination test more suitable to the small laboratory and clinical centre. Changes have been made in the protocol for the validation of antigens, in the method of obtaining a suitable antigen, and also minor revisions have taken place in preparing the antigen and the actual performance of the test.

In the original work by the senior author, the antigen was obtained from rabbit syphilomas in animals that had received a total of 600R x-irradiation twenty-four to forty-eight hours prior to intratesticular infection with the Nichols strain of *Treponema pallidum*. The x-irradiation was used to inhibit the antibody-forming mechanism of the animals in order to permit the harvesting of an antibody-free suspensions of treponemes that would not spontaneously agglutinate. Using such techniques, a valid antigen was established, but it has since been realised that the original procedures would perhaps prevent the use of the agglutination test in the small laboratory due to the expense and difficulties involved in the antigen preparation.

In the present work, the primary objective was to find a suitable substitution for the 600R x-irradiation since the equipment required to administer this amount of Roentgen units is large and not always available.

Since it had been shown that cortisone administered to syphilitic rabbits would so disrupt the host-parasite relationship as to permit the suppression of the host response and at the same time allow the spirochaetes to multiply uncontrolled (7), it was decided to start these substitution trials with 1.5 mgm of cortisone per kilogram of body weight administered only once a day. Upon harvesting the treponemes from the syphilomas on the eighth to tenth day post-infection, it was found that the numbers were few and those present showed signs of sensitisation to agglutination. The dosage was then increased to 4.0 mgm per kilogram of body weight administered once daily in the abdominal region (subcutaneously). This showed little improvement in the numbers of treponemes harvested, but on occasion, the yield was found to be free of natural antibody-carryover and was thus suitable for use in the agglutination studies. However, none was used due to the poor yield.

Accepted for publication March 17, 1955.

Finally, the daily dose of cortisone was increased to 5.0 mgm per kilogram of body weight. This proved satisfactory, particularly when the cortisone was started three to four days prior to infection with the spirochaetes. Yields from the syphilomas were very good in numbers and there was no evidence of sensitisation to agglutination due to natural antibody-carryover. However, better results may be obtained by using 6.0 to 7.0 mgm. per kilogram of body weight since the 5.0 mgm. dose seems to be the minimum effective dose. By using the larger doses, there seems to be less risk of encountering difficulties in antigen production due to individual animal variances.

The use of cortisone was not without its problems. Although harvesting of the treponemes took place prior to the development of the mucoid fluid described as hyaluronic acid (7), the testes showed the characteristic softness but with large amounts of blood in the tissue. When x-irradiated animals were used and the extractions were made in basal medium (5), there was little evidence of red blood cells and tissue debris in the antigen suspensions. With cortisonised rabbits and veronal buffer (3) as the extraction medium the red blood cells presented the major obstacle. Centrifugation at 2500 rpm for twenty minutes clarified the antigen suspension sufficiently for use, but with such a large number of red blood cells present initially, some haemolysis developed and could not be avoided. This, of course, precluded heat inactivation of the spirochaetes, but penicillin was found to be a successful substitute for killing the organisms (in a final concentration of 1000 units per milliliter of antigen suspension) as well as acting as a preservative.

One interesting factor observed during this experimentation was that when large amounts of red blood cells were present in the extraction, the number of spirochaetes seemed to be much less than that which would have been expected. However, when the suspensions were rapidly frozen in alcohol and dry ice, and then rapidly thawed three or four times to lyse the red blood cells, further darkfield examination revealed that the numbers of spirochaetes had increased considerably, even as much as two-fold.

As previously mentioned, veronal buffer has been used in this work for the extraction vehicle instead of basal medium. The latter is much too complicated to make in comparison with the former, and since maintenance of life of the treponemes is of no importance in the agglutination test, it was felt that the use of basal medium was unjustified and that its elimination from the procedure would be a further simplification of the test.

Finally, two minor modifications in the test procedure were tried and proved successful. First, the test was performed at room temperature and found to be valid; the only difference evident was the type of agglutination present at the end of six hours, i.e. type three (1) was predominant at incubator temperatures with shaking, whereas type one was predominant at room temperature with shaking. Thus with the test seeming to be valid at room temperature, the need for large incubator space to hold a shaking machine is not essential. Second, in validation of the antigen for the agglutination test, the time criterion was reduced from twenty-four hours to eight. It was felt that the antigen (when mixed with equal portions of normal human serum and/or normal saline), if it did now show agglutination within eight hours shaking at

room temperature, would not show false agglutination in a six-hour test.

Such an antigen as has been described in the foregoing paragraphs was used to test human sera to compare results with the Treponema pallidum immobilisation results. Three human sera that were negative to the TPI were also negative to the agglutination test. Eight human sera that were positive to the TPI, also proved positive by agglutination. One human serum that was found to be anti-complimentary and failed to produce results after three TPI tests proved negative on the first agglutination test. Subsequent sera on the same person resulted finally in negative TPI results. Two other sera which were considered toxic to the TPI were tested with one giving positive and the other giving negative agglutination results. Unfortunately, there were no follow-ups in these cases with respect to the TPI, therefore a direct, strict comparison cannot be made. However, these few isolated cases did raise the hopes that perhaps factors proving detrimental to the performance of the TPI would have no bearing on the agglutination test.

## Summary

1. Experimentation has shown that cortisone is a satisfactory substitution for x-irradiation to inhibit the antibody-forming mechanism of rabbits in order to permit the harvesting of an antibody-free antigen for use in the agglutination test for the serodiagnosis of syphilis.

2. Veronal buffer was found to be a suitable replacement for the more complicated basal medium; the test was found to be valid when performed at room temperature; and finally, penicillin was found to be satisfactory as an inactivant in place of heat.

## Discussion

Work on the agglutination phenomenon is continuing. At a later date, information will be made available on the following phases of the work which at the present time are incomplete: (1) the possibility of following the treatment of syphilis through the use of the agglutination test, (2) the possibility of making the test visible to the naked eye by cholesterinisation of the antigen in the manner of Cragie (2), (3) the possible substitution of congo red for cortisone as suggested by Touraine (6) as a further simplification of the test.

Efforts to reduce the time for the test below six hours were not attempted. The use of conglutinin which has to be diluted to avoid spontaneous agglutination (4) was not considered warranted at this time, since the present work is devoted to the simplification of the procedure and the elimination of factors that may cause the results to be viewed askance. Time, per se, was not considered as being of paramount importance in the present studies, since six hours was not felt to be excessive.

## Conclusion

It is believed that the agglutination test has a definite place in the serology of syphilis since it is easy to perform and the results are clear cut, being based on the presence or absence of agglutination and not being involved with the determination of diagnostic titres or numbers of organisms affected by various other factors.

The opinions expressed are those of the authors and do not reflect an official policy by the Medical Department of the U.S. Navy, the Navy Department, or the Naval service at large.

## ACKNOWLEDGEMENTS

The authors wish to express their appreciation for comments, criticisms, and encouragement to Professor E. G. D. Murray, McGill University, Montreal; Dr. A. Touraine, St. Louis Hospital Paris; and Commander J. M. Amberson, M.C., U.S.N. The co-operation of the staff of the TPI laboratory of the Naval Medical School is especially appreciated, as well as the permission granted by the Bureau of Medicine and Surgery, U.S. Navy, Washington, making time and materials available for these studies.

## BIBLIOGRAPHY

1. Cain, R. M., Canad. J. Pub. Health, 1953, 44:61.
2. Cragie, J.: J. Immunol., 1931, 21:417.
3. Ledbetter, R. K., Jr., and Martens, V. E.: The Treponema Pallidum Immobilization Test, Bureau of Medicine and Surgery, U.S. Navy, Navy Department, Washington 25, D.C.
4. McLeod, C. P., and Magnuson, H. J., Pub. Health Reports, 1953, 68:747.
5. Nelson, R. A., and Mayer, M.M., J. Exper. Med., 1949, 89:369.
6. Touraine, A.: St. Louis Hospital, Paris. Personal communication.
7. Turner, T. B., and Hollander, D. H., Bul. Johns Hopkins Hosp., 1950, 87:505.

# Community Treatment for Pinworms

H. SIEMENS, M.Sc., M.D., Dr.P.H.
*Leduc-Strathcona Health Unit*
*Edmonton, Alberta*

REPORTS of the incidence of pinworm infestation of children and adults have been recorded for many years and from many areas. To these reports may now be added the results of examinations carried out in the Leduc-Strathcona Health Unit in 1954 on 740 children, 5 to 17 years of age. Only a single cellulose tape swab was done showing an incidence of 38% with an age distribution as given in the table below:

| | Male | | Female | | Total | |
|---|---|---|---|---|---|---|
| Age | Pos | Neg | Pos | Neg | Pos | Neg |
| 5 | 2 | 1 | 3 | 2 | 5 | 3 |
| 6 | 23 | 51 | 34 | 35 | 57 | 86 |
| 7 | 36 | 56 | 47 | 82 | 83 | 138 |
| 8 | 21 | 33 | 27 | 26 | 48 | 59 |
| 9 | 15 | 18 | 13 | 15 | 28 | 33 |
| 10 | 10 | 17 | 8 | 16 | 18 | 33 |
| 11 | 8 | 14 | 7 | 21 | 15 | 35 |
| 12 | 7 | 11 | 4 | 12 | 11 | 23 |
| 13 | 6 | 5 | 5 | 6 | 11 | 11 |
| 14 | 0 | 7 | 4 | 7 | 4 | 14 |
| 15 | 4 | 9 | 1 | 4 | 5 | 13 |
| 16 | 2 | 4 | 0 | 0 | 2 | 4 |
| 17 | 0 | 1 | 0 | 0 | 0 | 1 |
| TOTALS | 134 | 227 | 153 | 226 | 287 | 453 |

Because infestation is so universal in our communities and efforts to free individuals or families of this parasite have not been signally successful in the past, private practitioners and health officers can hardly be blamed for developing an attitude of apathy and frustration with regard to dealing with this problem.

The vermifuges and vermicides employed in the past were either of such limited efficacy or possessed of such toxicity that they did not lend themselves to large scale treatment programs with safety. The development of piperazine compounds appears to offer preparations easy to take, encouragingly efficacacious, and relatively free of toxic or other objectionable side reactions. This combination permits of large scale treatment measures not considered feasible before, and encourages one to regard the problem as more amenable to action on a general public health base through energetic treatment of communities rather than of individuals or families.

In November 1954 a relatively isolated school district with a total population of 154 persons was persuaded to accept treatment with piperazine adipate tablets. Numerous interested local residents and the teacher helped secure the cooperation of householders in the faithful implementation of treatment measures. Treatment was taken simultaneously by all residents of the school districts for two weeks with a week of rest between. A 2½% ammoniated mercury ointment for perianal application after washing in the morning and at

night was provided. Detailed mimeographed instructions regarding personal and home hygiene measures were issued to every householder.

Because of the work involved and the difficulty of securing swabs on all residents, it was decided to swab only the 36 school children before and after treatment and to use the results as an index of the degree of success attained. Of the 36 school children, 15 showed positive swabs before treatment. Three weeks after treatment ended all school children were swabbed on two separate days and showed five still harboring the parasite in three families.

Inquiry showed that in none of these families had the tablets been taken as prescribed. New supplies were immediately issued and an assurance obtained that the instructions would be strictly observed. Five weeks after completion of this second course of treatment all school children were swabbed again. This time four of the five children positive at the last swabbing were still positive. Inquiry again revealed that none of the three families involved had been able to get all their children to take the tablets. Some complained of the taste, two developed cramps and several children, if forced to take them, would spit them out later. In no case were positive swabs secured from children who had taken the product as prescribed.

A second school district consented, after similar agreements and instructions, to take a pleasant tasting liquid piperazine citrate preparation for two weeks with a week of rest between. The liquid and tubes of perazil cream for perianal application were issued to the 163 residents of the community together with strict instructions regarding personal and home hygiene measures. Three weeks after completion of the course of treatment, swabs on the 25 school children showed one still positive where 11 were positive before treatment started. This child had taken the preparation faithfully but had a cousin visiting and sleeping with her during the second week of treatment. Treatment was repeated for this family and five weeks later swabs on all school children were negative.

It is recognized the time between treatment and the last swabbings is short and how long swabs will remain negative is not known. To determine this, periodic rechecks will be made.

The treatment doses used with both piperazine citrate (Burroughs Wellcome & Co.) and piperazine adipate (British Drug Houses (Canada) Ltd.) were those prescribed by the manufacturers:

PIPERAZINE CITRATE

| | |
|---|---|
| 1 to 5 months | ½ teaspoon daily |
| 5 months to 3 years | ½ teaspoon twice a day |
| 3 to 10 years | 1 teaspoon twice a day |
| over 10 years | 2 teaspoons twice a day |

PIPERAZINE ADIPATE

| | |
|---|---|
| 6 years or older | 2 tablets three times daily |
| under 6 years | 1 tablet daily for each year of age |

With both preparations, the two weeks of treatment are separated by a week without treatment.

These two small scale trials suggest that the preparations used are both sufficiently safe for large scale distribution and yield promising results when employed as directed by the manufacturers.

ACKNOWLEDGEMENT

We are indebted to British Drug Houses (Canada) Ltd. of Toronto and Burroughs Wellcome & Co. of Montreal for supplying the products used in these trials.

# The Role of the Dental Hygienist in a Dental Health Program

BRIAN J. O'MEARA, D.D.S., D.D.P.H.
*Division of Dental Public Health*
*Department of Health and Welfare*
*Prince Edward Island*

THE training and employment of dental hygienists in the public health field, at least in Canada, is still a novelty. In the United States there have been schools for dental hygienists for many years, but even there the main purpose of their training has been to assist dentists in private practice; it is only in the last few years that the schools have given much consideration to the training of students for public health appointments. As recently as 1952, a survey made by the Council on Dental Education of the American Dental Association showed that, of all the dental hygienist graduates of 1950–1951 who obtained employment, 82.2% went into dental offices, while only 12.9% went into the public school systems or into the Civil Services. There is no doubt, however, that the scope of usefulness of the dental hygienist in public health is becoming more appreciated. It is noteworthy that, in a comparison of the times allotted to the different subjects in the course on dental hygiene, the University of Toronto was giving considerably more time to the teaching of the cultural sciences, which have to do with dental health education, and less time to the clinical work, which is concerned mainly with dental prophylaxes and the duties of a dental assistant, than was the average American school at the time that this survey was taken.

Prince Edward Island was, I think, the first province in Canada to have dental hygienists trained with the assistance of Federal Health grants, and the first province to employ them in public health. I mention this for the record because it was stated in the Journal of the American Dental Association, in a report attributed to the secretary of the Canadian Dental Association, that Saskatchewan, which was then about to train dental hygienists, was the only province in Canada at that date, 1951, which had utilized the grants for this purpose. When I first went to Prince Edward Island in 1950, three dental hygienists, already so trained, were waiting there to take up their duties. It is rather remarkable that the first individual in Canada to take the initiative in this respect, was not herself a dentist. She was Miss Mona Wilson, the Director of Public Health Nursing for the province.

At that time, of course, there was no precedent established on how best to employ them. Broadly speaking, there were two main outlets for their usefulness, dental health education and treatment services, i.e. dental prophylaxes and topical fluoride applications. During these four years the program has gradually evolved into a blending of these, with some dental statistics added.

Presented before the Dental Public Health Section at the forty-second annual meeting of the Canadian Public Health Association held in the Chateau Frontenac, Quebec, May 31-June 2, 1954.

*Dental Health Education*

In the field of dental health education there is a vast amount to be done. The basis of any preventive program must be education, and the dental hygienist is particularly well suited for it, especially the education of children. There, though, one is confronted with a basic difficulty. By far the most suitable place for this education is in the school, and the school is very definitely the teachers' prerogative. An occasional visit to the school is generally welcomed by the teachers. But if the visits became more frequent the teachers would, quite rightly, resent it. It would be an intrusion, not only on their time, but on their work too. Education in dental health, as in other subjects, is their duty. It is to be regretted that only too frequently that duty is not fulfilled. The reason for this, at least in part, is because of their lack of knowledge of dental health. Unless they know the subject, they can hardly be expected to teach it. In any of the approved standard textbooks on health that I have seen, the part devoted to dental health has been in need of revision. The modern concepts of the process of tooth decay, and the preventive measures to overcome it, are often lacking or poorly explained.

On the other hand there is very good material available which fills this need. The booklet entitled "Your Child and Mine", prepared by the Dental Public Health Committee of the Ontario Dental Association, is excellent. So is the "Dental Health Manual", supplied by the Department of National Health and Welfare. This Department also has a very fine selection of posters, pamphlets and booklets, which are of great assistance. However, although this material is available to teachers on request to the provincial Departments of Health, the majority will not ask for it unless their interest has first been aroused. Even then, even when they have the required knowledge and a supply of the material, I feel that many are reluctant to teach it because they are uncertain how to present it in lesson form. This is a difficulty that we made an effort to overcome, by preparing simple lesson exercise sheets for pupils, with instructions to the teacher on how to use them and how to integrate them into the general education. The material for this type of dental health education was obtained from the Department of Health and Welfare of the State of Maine.It has some merit and I think it worthy of further consideration by health educators.

In order to promote more dental health education in the schools, the effort should be directed to the stimulating of the teachers to do more themselves, rather than to the taking over of their work. The inclusion of this subject in the courses in Normal School, and also at Teachers' conferences and conventions, certainly helps. But nothing is so effective as personal contact, and that is where the dental hygienist can play her part. By means of the occasional visit to the schools, she can speak to the teachers, arouse their interest, and make tactful suggestions. Because most of the teachers are female, and often about the same age, there is less reticence in the asking of questions and the raising of individual difficulties. The hygienist can give samples of the available material and explain how best to use it. Then, in a talk to the class, she can tell the pupils that the teacher will be giving them lessons in dental health

later on. This gentle persuasion, and an occasional word of encouragement, is frequently effective, and because Prince Edward Island is a small province it is possible for the hygienists to keep contact, by at least one visit to all the schools during the year.

*School Dental Examination and Parent Notification*

This method of individual education and parent notification is well known and is carried out in many places. The dental hygienists do this in the two main centres in Prince Edward Island during the winter and spring, when road and weather conditions make country travel too difficult. They examine all the school children in these two centres, record their findings on dental charts, give individual instruction in toothbrushing and oral hygiene and notify the parent when a visit to the family dentist is required.

When these examinations are carried out by hygienists, the need for tact in preserving good relationship with the practising dentists is of the greatest importance. It is so very easy to make an intended innocent remark which is construed to be a criticism of the dentist's work, and which will invariably get back to the dentist. Criticism of one dentist's work by another dentist is unfortunate enough. When made by a dental hygienist it is doubly so because of her different relationship. For a similar reason, neither the child nor the parent should be informed of the number of cavities found, nor the type of treatment required. In fact, when calling out the location of cavities to another who is recording the information on the chart, it is frequently unwise even to mention the word "cavity". Most children are mentally alert and can count the number of cavities recorded for themselves. If this number differs from that reported by the dentist afterwards, the good relations between dentist and patient, and as a result, between dentist and hygienist, deteriorate.

In these school examinations the duties of a dental hygienist should be confined to education in oral hygiene, the charting of the dental conditions found, and the notification to parents of the need for a visit to the dentist when carious teeth are present. She should not be expected to diagnose treatment of any type. She has not been trained to do so. If she does suspect an abnormal condition, she should tell the child to seek a dentist's advice.

The effect of this method of individual education and parent notification has generally been found to bring about an improvement in hygiene and in the amount of treatment carried out. We found that that occurred too, in the first year. The results of the second annual examinations showed a definite improvement when compared with the first. The third and fourth examinations were not so satisfactory. The initial enthusiasm seemed to have waned. This year, therefore, an additional inducement has been given to have more dental treatment done.

*Topical Sodium Fluoride Treatment for Schoolchildren*

The parents of any school children under the age of 14 years are now informed that these children can receive topical applications of sodium fluoride, free of charge, provided all necessary fillings and extractions are completed first. Certificates have been given to them, to be signed by their dentist when

treatment is completed, and by themselves that they give their consent for the fluoride treatment to be done. If the hygienists find, during the school examinations, that no treatment is required, they sign the certificates in place of the dentist. It is always advisable to obtain the written consent of the parent, for self-protection. The child might have a digestive upset after a topical fluoride application and although it would be quite unassociated with it, the fluoride might be blamed. At the present time, with so much anti-fluoridation literature about, people are made very conscious of the fact that fluorine is a poison. It would, of course, be quite impossible for a child to swallow sufficient fluoride, under normal circumstances, to have any harmful effect, but parents do not know that.

At the first visit the hygienist gives a thorough prophylaxis before applying the sodium fluoride. For the subsequent visits she asks the child to bring his own toothbrush. This serves a threefold purpose. First, it discovers if the child has a tooth brush in reasonable condition; second, it permits the hygienist to observe if the child brushes his teeth in the correct manner, and to correct him if he is at fault; third, the teeth are freshly cleaned just before the fluoride is applied.

Because this is a new program, it is not known yet how effective it will be in promoting more dental treatment. An evaluation of it can not be obtained until next year when the school examinations are repeated. However, if topical fluoride treatment is to be given, it would appear a better policy to offer it in this way, as a reward, than to give it indiscriminately no matter what the dental condition may be. To begin with, the educational aspect is still present, and the offer is more appreciated because personal effort is required to obtain it. Then, of course, the beneficial effects of the fluoride applications will be more evident in a mouth already cared for. Lastly, if that condition is not insisted upon, there is a very marked tendency on the part of some parents to regard the fluoride applications as a substitute for dental treatment rather than as an adjunct to it, thus defeating the whole purpose of the offer.

*Topical Sodium Fluoride Treatment for Pre-school Children*

The treatment of pre-school children, and the education of their parents, is probably of greater importance than the treatment of school children. In Prince Edward Island the dental hygienists have been operating a topical fluoride clinic for these pre-school children, between the ages of 3 and 5, since 1951, devoting about three months to it each summer. With these younger children it is not made a condition that dental treatment should be completed first. There is a reason for this. A large majority of them have never had dental treatment before, and the fluoride clinic serves as an excellent introduction for them to a dental office under pleasant circumstances.

Apart from offering the beneficial effects of the fluoride applications, the purpose of this clinic is also educational. It is possible for the hygienist to give instructions to the parent in the brushing and general care of the child's teeth, and to indicate directly to the parent when fillings are required.

The dental hygienist is ideally suited to this type of work. She can generally

handle a 3-year-old child much better than a dentist can, and some of these children require a great deal of patience. It is expecting a lot from a 3-year-old that he should remain still, with mouth open, for the requisite period for the fluoride to dry on the teeth.

One hygienist suggested a simple aid to this which works surprisingly well. Suspend an egg-timer, of the ordinary hour-glass type, in front of the child. Then tell him that he has to remain still, with his mouth open, until all the sand has run through. This gives him something on which to concentrate, and he is generally much more cooperative. I do not know if this suggestion is original, but I can recommend it.

A small number of these children, 81 to be exact, who were treated in 1951, nearly three years ago, were recently re-examined in the schools at the ages of 6 or 7. Although this number is insufficient to give an accurate picture, it was instructive to make a comparison of their dental condition with the remainder at these ages who had not received topical fluoride applications.

Only the deciduous teeth were considered because none of the permanent teeth were present when the fluoride was applied; and only decayed and filled teeth were included because of the difficulty in judging whether a missing deciduous tooth had been extracted or naturally exfoliated.

The first point of interest was what effect the fluoride applications had had. The results certainly indicated that there had been a reduction in the amount of tooth decay. There were 19% less decayed or filled teeth in the treated cases.

It should be understood that this is not intended to be evidence that the topical applications of fluoride, on this occasion, caused a reduction in tooth decay of only 19%, instead of the generally accepted figure of 40%. It must be remembered that no account was taken, in either the treated or the untreated cases, of teeth which had already decayed at the age of 3 or 4, when the sample group received the fluoride treatment. Also, at the age of 6 or 7, there were undoubtedly more missing teeth which had been extracted, in the untreated group. If both these factors had been taken into consideration, the reduction would have been much nearer to the 40%.

Another result of this comparison was more significant. It was found that 4½ times as many teeth had been filled in the treated cases as in the untreated. Admittedly, although the fluoride treatment had been given free of charge, a large majority of the children who received it were in the higher economic and social level, and more likely in any case to have dental treatment carried out. At the same time I feel that this large difference must have been due, to some extent, to the education given by the dental hygienists in the fluoride clinic.

*Dental Statistics*

In order to evaluate the effectiveness of any of these projects, it is necessary to keep statistical data. During the school examinations, the dental findings are recorded on charts. There would be little reason in doing so unless the findings could be tabulated, and use made of the data obtained. The accuracy of these findings, when obtained from clinical examinations alone, by different examiners, is open to question. However, so long as this limitation is realized,

the statistical information, for the purpose of program evaluation, can be of considerable assistance. In the event of fluoridation being introduced into a community, it would be of particular importance.

For this purpose the I.B.M. card, operated by machine, would have been ideal. However the entering of D–M–F rates on these cards creates a problem, while the recording of the rates of decayed, missing and filled teeth, or tooth surfaces, according to age, and under varying circumstances, is essential. As an alternative a punch card was devised, on which all necessary statistical information can be entered. This has proved quite satisfactory.

The recording of this information is another duty which can be performed by dental hygienists. When not employed otherwise, such as when the fluoride clinics are not in operation, and during school holidays, or after school hours and on Saturday mornings, our hygienists carry out this work. They transfer the information from the dental chart to a punch card, record the child's name and chart number on the punch card and also on an alphabetical file, and then file away the dental charts in numerical order. In this way the individual chart and punch card can be used each year, and the dental progress of the child noted.

## Conclusions

These different tasks can keep a dental hygienist fully and profitably employed. All her work, even when giving topical fluoride applications, is basically dental health education: education of the teacher; education of the child; education of the parent. Like all other forms of health education, progress is slow and the results unspectacular, but she is fulfilling an essential need in this field.

In Prince Edward Island the dental hygienists appear to enjoy their work and carry it out with a refreshing enthusiasm. The variety of their duties plays, I think, a large part in this. They are well received by school principals and teachers, and by the children and parents with whom they come into contact. After four years I have come to rely on them very much and would be at a loss now to carry out a dental health program without their assistance.

Three dental hygienists are at present employed in the province, but they are not the same three who were employed originally. I find that the turnover is much too rapid, due to circumstances beyond my control, and it is always necessary to think ahead in order to have replacements.

These three girls received their training at the Forsyth School for Dental Hygienists in Boston. It was a two-year course and it appears to have given them a thorough grounding in their work. Even so, they still had to learn quite a little in relating this work to public health. Much of this was accomplished by employing them on field work in the province during the summer between the first and second year of their course. This gave them an indication of the subjects on which they should concentrate during their final year. The director of the Forsyth School was also most helpful in this respect.

Until facilities increase for the training of dental hygienists in Canada, we must continue to rely largely on the American schools. However, it is time that the situation in Canada improved. Although the American schools are very

good, they must give consideration to the fact that the majority of their students are preparing to go into dental offices. It is most unfortunate that it should be necessary to send Canadian girls to schools in the United States for training, in order to employ them in the public health field in Canada.

REFERENCES

1. Report of the Council on Dental Health Education; Data on Dental Hygienist Training programs; J.A.D.A., 1952, *44*: 321.
2. Swanson, M. E.: The Curriculum Content in Courses in Dental Public Health and Preventive Dentistry in Schools of Dental Hygiene; An address given before the Dental Health Section of the American Public Health Association, New York, November 1953.
3. Curriculum of Course in Dental Hygiene; announced by the Faculty of Dentistry, University of Toronto.
4. News of Dentistry (International); "Canadian Federal Grant Aids Dental Hygienist Training"; J.A.D.A., 1951, *43*: 511.

## COMING MEETINGS

**Ontario Public Health Association**
**and**
**Canadian Institute**
**of Sanitary Inspectors**
(Ontario Branch)

**Royal York Hotel, Toronto**

**October 6, 7 and 8, 1955**

# *Canadian Journal of Public Health*




## ADMINISTRATION OF POLIOMYELITIS VACCINE (SALK)

AT the meeting held on April 12 in Ann Arbor, Michigan, when Dr. Thomas Francis Jr., presented the report of the Poliomyelitis Vaccine Evaluation Centre, Dr. Salk also presented an address in which he outlined a new schedule for the administration of the vaccine. He stated that the first two inoculations in the three inoculation series are sufficient to induce a primary stimulation of antibody formation in the blood serum. In the revised plan these two injections would be given with an interval of two to four weeks between doses. The third dose would be given after an interval of at least seven months. When given at this interval, he had found that the third inoculation has a reinforcing or booster effect. He emphasized that the maximum effect of the third dose was obtained only after a minimum period of seven months. Following the first dose, the antibody titre rises, reaching its peak in about four weeks. The administration of the second dose causes a further modest rise in titre, reaching its height about the 8th week. During the following months the level of antibodies gradually falls to that reached after the first inoculation. The administration of the third dose after seven months occasions a very rapid increase in antibodies to a level many times the level obtained following the first and second doses. The result is comparable to that obtained in diphtheria immunization where the reinforcing dose given after a period of 8 to 12 months produces a high level of antibody. Dr. Salk stated that protection is not afforded by one dose, but he is hopeful that sufficient protection will be afforded by the second dose to prevent the development of paralysis if a child becomes ill with poliomyelitis during the long interval between the second and third doses.

The adoption of this plan of administration by the National Foundation for Infantile Paralysis Inc., New York, and by seven of the Provincial Departments of Health of Canada, has permitted the giving of the vaccine to a larger number of children through utilizing the vaccine reserved for the third dose in the original schedule, to provide the first and second doses for the additional number of children. The large trial which is being made of the revised plan of dosage will provide an answer to the question of the degree of protection afforded by two doses of the vaccine.

In connection with the present use of the vaccine, Medical Officers of Health should endeavour to correct the impression given by newspapers and popular articles that the vaccine is nearly 100% effective in preventing poliomyelitis. The report of Dr. Francis concludes with this statement:

> "On this basis it may be suggested that vaccination was 80 to 90% effective against paralytic poliomyelitis; that it was 60 to 70% effective against disease caused by Type I virus and 90% or more effective against Type II and Type III virus. The estimate would be more secure had a larger number of cases been available."

As the great majority of poliomyelitis cases in Canada is caused by Type I virus, the probable percentage effectiveness would be from 60 to 70% and this would relate to children who had received *three* doses of vaccine. The vaccine used was not perfect and cases of poliomyelitis occurred among children receiving not one or two doses but three doses, as administered in the plan of last year, with a short interval between the second and third doses. The poliomyelitis vaccine introduced by Dr. Salk has great promise. It is however, not perfect, but there is every reason to expect, as does Dr. Salk, that it will be further improved.

To-day, public health authorities and the medical profession have a new tool to use in the control of poliomyelitis. Some cases of poliomyelitis, with or without paralysis, may occur among the vaccinated if the disease is prevalent. The report presented by Dr. Francis indicates that the vaccine may be expected to be effective in reducing by two-thirds the number of cases of poliomyelitis among the vaccinated. This is, indeed, a great contribution to the control of the disease.

In administering the vaccine to many thousands of children, illnesses will be reported and it is likely that parents may attribute such illnesses to the vaccine. A child may be developing measles or some other disease at the time the vaccine was given and before the diagnosis is made, and the illness may be attributed to the vaccine. It is, of course, essential that in the use of the vaccine in Canada this year, in which approximately one million children will receive two doses, that information should be obtained concerning any reactions that can be properly attributed to the vaccine. It is of interest, that in the trial in the United States when approximately 450,000 children received the vaccine, only 16 marked reactions were observed, or about 4 in every 100,000. Minor reactions were reported to the extent of about 5 in every 1,000. Among the children who received the harmless substitute for the vaccine, approximately the same incidence of reactions was observed. Physicians and nurses administering the vaccine should remember that the vaccine contains very small quantities of penicillin and streptomycin. A child highly sensitive to these antibiotics may develop an immediate reaction or give evidence later of fever and urticaria.

Reference has been made to the occurrence of illnesses that may normally occur in any large group of children. It may be possible also, that poliomyelitis will occur in the community and that some children who have received two or three doses may develop the disease since the vaccine is not completely effective.

In the United States recently, illness occurred in some children who had received vaccine and pending a detailed investigation, the distribution of the vaccine from the supplying laboratory has been suspended. This occurrence has occasioned concern on the part of the public. The National Institutes of Health in Washington and the Laboratory of Hygiene in Ottawa supervise the distribution of all vaccines, sera and new drugs and established procedures for testing, by the laboratories preparing the vaccine, which are designed to assure that vaccine meeting these requirements is both safe and effective. In Canada, the vaccine distributed by the Provincial Departments of Health has been prepared by the Connaught Medical Research Laboratories, University of Toronto, in accordance with these requirements. Each lot of vaccine has been tested in the Laboratory of Hygiene, Ottawa, as well as by the Connaught Medical Research Laboratories.

The program of control of poliomyelitis through vaccination must be conducted over a period of years to be effective, as has been demonstrated in the control of diphtheria through the use of diphtheria toxoid. The achievement of Dr. Salk in preparing an effective vaccine points the way to ultimate control through vaccination. The report of Dr. Francis indicates that the vaccine should be used as widely as is possible. Adequate protection against poliomyelitis requires the administration of three doses and a minimum period of at least nine months. If these facts can be appreciated by parents, there will be a proper understanding of the value and the limitations of the present vaccine in the control of poliomyelitis.

# NEWS

## Saskatchewan

THE SASKATCHEWAN PROGRAM for administering poliomyelitis vaccine will begin early in May. Vaccine will initially be given throughout the province to all children born in 1949 and 1950. The Minister of Public Health has announced that the program will eventually be extended to include persons up to and including the age of 34 years as rapidly as vaccine can be obtained. The next priority group will be children below the age of five.

THE DEPARTMENT OF PUBLIC HEALTH sponsored a Child Safety Day, observed May 1, on request of the Honorable T. J. Bentley, following publication of 1954 accident statistics. It was found that 83 children died as a result of accidents, mostly on home premises, and that 3,925 children under 15 were treated in Saskatchewan hospitals for accidental injuries sustained during the year.

A REFRESHER COURSE in obstetrics for Saskatchewan physicians and nurses was given late in January by the Saskatchewan Department of Public Health, the College of Medicine of the University of Saskatchewan and the College of Physicians and Surgeons at the new University Hospital, Saskatoon. Four special guests were invited. Dr. H. B. Atlee, professor of obstetrics and gynaecology at Dalhousie University, Miss M. B. Ford, senior consultant in nursing at the University of Wyoming, Dr. J. A. Brown, Regina, and Dr. J. G. McCarroll, Moose Jaw.

This Institute was the first of its kind in Saskatchewan and was attended by a group of 81 doctors and 88 nurses, including specialists and family physicians, country and city practitioners and those engaged in public health and hospital work.

DR. IRIAL GOGAN, medical health officer for the Regina Rural Health Region since 1953, has been appointed director of Hospital Administration and Standards. Dr. M. K. Dehnel, Assiniboia-Gravelbourg Health Region, is replacing Dr. Gogan in the Regina Rural Health Region.

DR. F. S. LAWSON has returned to the government service as the director of the department's psychiatric services branch. He served previously with the department as superintendent of the Saskatchewan Hospital, Weyburn, from 1947 to 1948, and as superintendent of the Saskatchewan Hospital, North Battleford, from 1948 to 1953. Dr. Lawson succeeds Dr. D. G. McKerracher, who has directed the branch since 1949. Dr. McKerracher has been appointed professor of psychiatry at the University of Saskatchewan and head of the psychiatric department at the new University Hospital in Saskatoon.

DR. S. C. BEST, director of child health for the department has recently been elected a Fellow of the American Academy of Paediatrics.

THE FIRST ANNUAL MEETING of the newly formed Saskatchewan Branch of the Canadian Public Health Association was held in Regina on April 12 and 13, attended by 220 members and observers. The branch now has 185 members.

Dr. A. E. Chegwin, branch president, presided over an interesting and varied program. The first day of the conference coincided with the announcement of the success of the Salk vaccine and Dr. A. J. Rhodes, well-known virologist from Toronto spoke on "Recent Advances in Poliomyelitis." Three other papers were presented during the first session of the conference by members of the Department of Public Health. Dr. Peter Peacock, medical health officer of the Moose Jaw Health Region where research experiments on rheumatic fever are underway, described "Rheumatic Fever Prophylaxis." The question "Should the Psychotic Be Given More Freedom?" was introduced and discussed by Dr. Ian Clancey of the Saskatchewan Hospital, Weyburn. Dr. V. L. Matthews, medical health officer of the Swift Current Health Region, chose the subject "The Swift Current Health Region: An Experience in the Coordination of Health Services."

Two panels followed with "Modern Concepts of Rehabilitation" and "Housing, its Economic, Social and Health Implications" being discussed.

The conference concluded with a business meeting and the election of officers for the forthcoming year. Dr. A. E. Chegwin, provincial director of the Dental Health Division

was named president for a second term and Dr. M. S. Acker, director of Research and Statistics in the health department was re-elected secretary-treasurer. Miss Hester Lusted, assistant professor of public health nursing at the University Hospital was chosen vice-president.

Other members elected to the executive included: E. L. Abbott, Dr. N. Abelseth, Dr. V. L. Matthews, Miss E. Moore, Dr. I. Gogan, Glyn Myers, G. A. Roeher and V. Thomas.

Three resolutions were passed at the meeting: (1) A recommendation to the Saskatchewan government that a fund be established to provide low interest, self-liquidating loans to municipalities for construction of waterworks and sewerage systems. (2) The Association pledged itself to promote all reasonable measures to achieve fluoridation of communal water supplies in Saskatchewan. (3) Public health bodies were called upon to make early diagnostic services available to all individuals, at no direct personal cost, so adequate preventive therapy can be carried out as quickly as possible.

**Manitoba**

THE DEPARTMENT OF HEALTH and Public Welfare in conjunction with the Manitoba Department of Education, will conduct a six week Workshop in Health Education commencing July 6 at the Manitoba Technical Institute. The purpose of the workshop will be to acquaint teachers with various aspects of the Health Education program, the resources and materials available for the program on the local as well as provincial levels, and the methods and procedures helpful in the organization and conduct of the program. The main objective, however, will be to provide each teacher with an opportunity to discuss and plan a health education program for his or her own school.

The Bureau of Health and Welfare Education will provide all the necessary films, filmstrips, and pamphlets and will arrange a number of field trips. Directors and supervisors from the Department of Health and Public Welfare will assist with technical information and suggestions for program planning.

DR. J. DUPONT, on leave of absence from the Department to obtain his Diploma in Public Health from the University of Toronto, will return to his post as Medical Director of the Virden Health Unit June 1.

DR. J. HENDRY is leaving the Brandon Health Unit on June 1. He has been granted a federal bursary to study pathology and will be working at the Winnipeg General Hospital under Dr. D. Penner, assistant director of pathology.

AN INSTITUTE on teaching nutrition to nurses was held in the provincial health building on April 19 and 20. The institute, which was sponsored by Nutrition Services, Bureau of Health and Welfare Education, was the first of its kind in Canada.

SIXTY-FIVE MEMBERS of the nurses section of the Manitoba Public Health Association visited the Selkirk Hospital for Mental Diseases on May 7. Following tours of the reception and infirmary wards, the nurses attended short lectures by members of the hospital staff on modern methods of treatment and rehabilitation.

HEALTH WORKERS in the province were offered a variety of institutes at the University of Manitoba during the month of May. Short courses on maternal health and milk plant operation and institutes for hospital matrons and operating room supervisors were included on the agenda.

**Ontario**

THE DIVISION OF SANITARY ENGINEERING, Ontario Department of Health, is the sponsor of a four-week refresher course for chief sanitary inspectors. The course—the first of its kind in Ontario started at the Provincial Institute of Trades, Toronto, early this month. Twenty-one senior or chief inspectors from all parts of the province are in attendance. The course is under the direction of Major A. S. O'Hara, sanitation consultant for the Ontario Department of Health. A second course will commence next January.

**New Brunswick**

THE HONOURABLE J. F. MCINERNEY, M.D., has announced the appointment of Mr. J. G. LeBlanc to Assistant Chief Welfare Officer in the Social Services Branch of his Department. Mr. LeBlanc was formerly Assistant Director of the Old Age and Blind Pensions Board. Mr. J. Leonard Arsenault of Richibucto will succeed Mr. LeBlanc as Assistant Director of the Old Age and Blind Pensions Board.

THE NEW PROVINCIAL poliomyelitis clinic and health centre received its first patients on April 6. The Honourable J. F. McInerney, Minister of Health and Social Services, Dr. J. A. M. Bell, Director of the Clinic and Health Centre, Dr. J. A. Melanson, Chief Medical Officer, Dr. G. E. Chalmers, Victoria Public Hospital and Miss V. Burchill, nursing supervisor of the clinic were present.

**Nova Scotia**

THE FOLLOWING NURSES have joined the Department of Public Health for a period of in-service training before attending University this fall: Miss V. Hashem to Windsor, Miss M. Zwicker to Yarmouth, Miss M. Langley to Truro and Miss K. Bird to Sydney.

A PREVENTIVE DENTAL PROGRAM, utilizing the services of dental hygienists, will be started in the Fundy, Cobequid and Cape Breton health regions during June, 1955. The program will operate for the preschool and children in the elementary grades (I to VI) and will consist of dental examinations, dental prophylaxis, instruction in the proper method and timing of tooth brushing, instruction in dietary methods for the control of dental caries and topical application of fluorides for children in the three and seven year old age groups.

This will be the first time dental hygienists have been employed in Nova Scotia. Miss H. Atkinson, Truro, Miss L. Bradley, Old Barns, Colchester Co., and Miss A. Petipas, East Tracadie, Antigonish Co., will carry out the program.

**Prince Edward Island**

THE DEPARTMENT OF HEALTH completed plans for the administration of the Salk poliomyelitis vaccine. During the week of April 4, 2,378 Grade I children were given the first dose. The second dose was given the week of April 18. With the announcement by Dr. Salk that the third dose would be given after an interval of at least seven months, it was decided to utilize the third dose as the first dose for the Grade II children, commencing the week of May 16 and giving the second dose in June.

DR. OWEN CURTIS, Deputy Minister of Health attended the Dominion Council meeting in Ottawa on April 21.

THE NEW BRUNSWICK-PRINCE EDWARD ISLAND BRANCH meeting of the Canadian Public Health Association will be held in Charlottetown on May 20.

# EMPLOYMENT SERVICE

Advertisements regarding "positions available" and "personnel available" will be published in from one to three consecutive issues, depending upon the requirements of the agency or person concerned. They are limited to seventy words or less, with a confidential box number if desired. There is no charge for this service to members of the Association. Health agencies are charged a flat rate of $10.00 for the advertisements (up to four consecutive issues) and for the service. The rate for non-members is $5.00. The service includes confidential clearing of information between prospective employer and employee if desired.

**Public Health Nurses** required by Department of Health, City of Kingston. Salary range in effect, five day week, pension and hospitalization plans available. Apply to Medical Officer of Health, City Hall, Kingston.

---

**Public Health Nurses** for generalized program. Minimum salary $2700, with allowance for previous experience and annual increments of $120. Cumulative sick leave plan. Pension plan and Blue Cross plan available. Interest free loans available for purchasing cars if necessary. Liberal transportation allowance and holidays. Apply to A. E. Thoms, M.D., Director, Leeds and Grenville Health Unit, Victoria Building, Brockville, Ontario.

---

**Sanitary Inspector**, qualified, required by the East York–Leaside Health Unit. Salary range in effect, transportation provided. Pension and hospitalization plans are available. Apply to Medical Officer of Health, East York–Leaside Health Unit, Coxwell and Mortimer Avenues, Toronto 6.

---

**Sanitary Inspector** required for generalized program in health unit. Excellent working conditions, pension plan, Blue Cross and P.S.I. available. Car allowance. Write to Dr. Charlotte M. Horner, Medical Officer of Health, Northumberland-Durham Health Unit, Cobourg, Ontario. 5-7

---

**Staff Nurses** required for Kent County Board of Health Unit. Policies are 38 hour week, three weeks holiday with pay, all statutory holidays, two days a month sick leave accumulative to 48 days. Uniforms provided. Minimum salary $2700, plus annual increments as determined by the Board, to a maximum of $3100.

---

**Public Health Nurse** with experience, preferably trained in Ontario. Good personnel policies, car provided, in-service training related to treatment and care of orthopaedic patients. Apply, stating age, to Supervisor of Nursing, Ontario Society for Crippled Children, 92 College Street, Toronto, Ontario. 5–7

---

**Sanitary Inspector**, qualified, bilingual, required by Prescott and Russell Health Unit. Minimum salary $2600, with allowance for previous experience and annual increments. Five day week, car allowance, Blue Cross and sick leave. Apply to Dr. R. G. Grenon, Director, Prescott and Russell Health Unit, Hawkesbury, Ontario. 5–6

---

**Bacteriologist** for senior position in the Ontario Public Health Laboratory Service. Medical or major degree in science with laboratory experience required. Address: Deputy Minister, Ontario Department of Health, Toronto 2, Ontario.

---

**Sanitary Inspector** required for generalized program with the Bruce County Health Unit. Minimum salary $2700, with allowance for experience. Pension and Blue Cross plans available. Car allowance 9¢ per mile. Apply to T. H. Alton, Secretary-Treasurer, Bruce County Health Unit, Walkerton, Ontario. 5–6

---

**Public Health Nurses**, qualified, for generalized public health nursing city service and one for secondary school program. Basic salary $2900 for C.P.H.N. and $3000 for B.Sc. N., adjusted according to experience on starting. Annual increment $150. Shared pension, medical care and hospitalization plans. Sick leave accumulative. One month vacation. Transportation provided or car allowance. Apply Medical Officer of Health, Peterborough, Ontario.